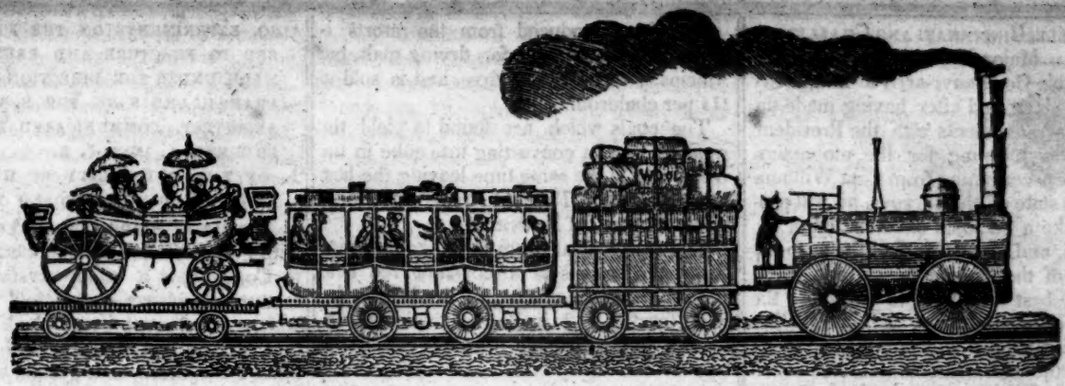

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 27, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America*.

☞ SUBSCRIBERS IN THIS CITY. who change their residence on the 1st of May, will please give notice at the office, 30 Wall-street, *Basement Story*. It is desirable that the notice should specify their late and future residence.

RAILROADS—*Their value tested by these hard times.*—The present pecuniary difficulties have tested thoroughly public confidence in the value of *stocks*. It will have been remarked by most of those who have noticed the course of events that the stock of those Railroads in successful operation, has been less depressed by the scarcity of money than *any other* kind of stock in market. It is true that the stocks of *unfinished* roads have been considerably depressed, yet not more than *Bank* Stocks, which had been deemed by many the best kind of investment. *This important fact*, in relation to Railroad Stocks, should be fully understood by this community which is so deeply interested in the success of Railroads Every person interested in the success of any particular road, or in the *system generally* should understand fully, and impress upon his neighbor, that *judiciously* located Railroads will not only pay a good dividend on his investments *in the road*, but it will, at the same time, greatly enhance the value of his real estate if he has any. Such works produce a *general increase* in the value of property. They are public benefits. *They benefit all.*

CENTRAL RAILROAD—GEORGIA.—The Editor of the *Savannah Georgian* thus announces the opening of this important road.

We enjoyed the pleasure yesterday afternoon of a ride on the Railroad for a few miles from the vicinity of the city. In two or three weeks, perhaps in less time, our citizens will have the gratification of a ride for *nine* miles on the Road, destined to be the link between the waters of the vast Atlantic and the mighty river of the West. Our columns being occupied by the effusions of native genius, which are ever hailed with emotions of pleasure, we must deny ourself the pleasure of dwelling on this first trip of the second Locomotive which has coursed its way on our native soil, and the first on a road which is ere long to bind the sons of Yamacraw in fraternal union with the Western sons of Georgia, Tennessee, and other States.

We must offer the same reason as our apology for omitting to acknowledge this morning, a beautiful present from the garden of one of Flora's devotees.

Could we print by steam, we would expend oceans of ink in the praise of our Railroad Engine, and the Roses and Lilies which bloom before us

We are authorized to inform our readers that the Engine will be in motion this afternoon at *three o'clock*, for the accommodation of the public.

CUBA.—*Railroads and Steam Navigation.*—The railroad from Havana to Bambano, (on the South Coast of the Island,) is in operation for five miles, and five leagues will be completed by the first of June. This is the first work of the kind in Cuba. There are several others projected, to wit:—from Carderas to Soledad de Benba; from Matanzas to Guanaja; from Guanaja to Porto Principe, and from thence to the South Coast. Steamboat navigation along the coast is increasing. Three fine boats regularly ply between Havana and Matanzas. One between Havana and Carderas, touching at Matanzas, and lately the steamer Yumuri left Havana for Guanaja, the port of Porto Principe, to touch at Mantanzas, Carderas, and San Juan de los Remedios, being the first regular packet on this line. These and all similar improvements receive the largest portion of their impulse from the liberal enterprising spirit of his Excellency Governor Tacon, who in consequence of the successful result of his late expedition against St. Jaga de Cuba, has lately received three military orders, one of which is Marquis de la Union de Cuba, as a testimony of the approbation of the government. The estimation in which the military hold their chief, the Governor-General, will be manifested by a grand dinner and ball, on the 4th inst., to be given to him by voluntary subscription, and to which the private citizens will be invited.—[N. Y. Express.]

LOUISVILLE, CINCINNATI AND CHARLESTON RAILROAD.—Major M'Neill, the Chief Engineer of this Company, arrived in this city a few days since, and after having made the necessary arrangements with the President left here this morning for the mountains, where, after ascertaining from Capt Williams the present state of the surveys, he will proceed to make a personal examination of the whole line, and give such directions to the operations of the Engineers, as may, in his opinion, be best calculated to advance the work. It is hoped that by the time the necessary explanations and surveys shall be completed, the embarrassments under which the country now labors, may be so far removed, as to offer no serious obstacle to the progress of this great work.—[Charleston Mercury.]

RAILWAYS IN LONDON.—The extension of the Birmingham Railway, from the originally intended terminus at Camden-town to Euston-grove, near the New-road, is progressing rapidly, and the scaffolding is erected for the stupendous portico, which is to be composed of six columns, of the enormous height of forty feet, and proportionable thickness! The railway crosses the Hampstead-road and Park-street (leading to the east gate of the Regent's-park,) in an excavation of the depth of from twenty to thirty feet, although, at no great distance, it is carried over the Regent's canal at a height sufficient to allow the passage of barges below. The London Grand Junction Railway, which is to leave the Birmingham at its original terminus, and carry on the line to the verge of the City, has also been commenced with considerable spirit, nearly at the back of Messrs. Cubitt's, the contractor, in Gray's-Inn road. It is, at that part, at least, to be carried on arches, after the fashion of the Greenwich Railway, and very little progress can be made in the line either way, from the present site of operations, without pulling down houses and buildings of very modern erection. Its course will, in general, follow that of the *celebrated* River Fleet, whose channel, which within a short time saw "the light of day" in that vicinity, is now covered over there, as well as in most other parts watered by its "translucent streams."

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

XXII. AN ABSTRACT ACCOUNT OF COALS USED IN COKE OVENS AND RETORTS, AND COKE PRODUCED FROM ONE YEAR'S WORK AT THE IPSWICH GAS WORKS. COMMUNICATED BY WM. CUBITT, ESQ., F. R. S., &C., V. P. INST. C. E.

The coke ovens from which the following statement is made are worked with a daily charge of 20 bushels of coals, which are burned off in 24 hours.

Each oven, by means of its spare heat, keeps at a constant working state 6 retorts for making coal gas, which retorts are charged with 10 bushels of coals three times per day in a general way.

The coke produced from the ovens is the best possible quality for iron founders and malsters, and is sold at 28*s.* per chaldron of 36 bushels.

The coke produced from the retorts is used by some persons for drying malt, but principally for common fires, and is sold at 21*s* per chaldron.

The coals which are found to yield the greatest heat in converting into coke in the ovens, and at the same time leaving the best coke, are *Pitt's Tanfield Moor*, fitted only by H. Clayton, of Newcastle.

The waste heat from these coke ovens keeps the retorts at a constant red heat through an entire coating of fire-bricks, varying from 8 to 3 inches in thickness, according to the distance from the end of the coke oven.

1825.	Coals used in Ovens.	Coke produced.	Coals used in Retorts.	Coke produced.
	Ch. Bu.	Ch. Bu.	Ch. Bu.	Ch. Bu
January,	31 32	36 9	37 18	55 16
February,	28 20	29 27	27 18	40 34
March,	27 10	31 15	25 0	37 4
April,	16 24	19 7	16 18	24 15
May,	15 15	17 35	7 24	11 16½
June,	15 6	17 24	6 0	5 32½
July,	15 18	18 1	7 6	10 27
August,	24 4	28 0	8 17	12 22
September,	30 0	34 29	27 0	39 16
October,	33 4	38 22	30 20	45 25
November,	34 18	40 18	35 2	51 32
December,	41 4	46 6	45 20	70 0
	313 11	358 13	273 35	405 24

EXPERIMENTS TO SHOW THE WEIGHT OF COKE PRODUCED FROM BOTH COKE OVENS AND RETORTS WITH A GIVEN WEIGHT OF COALS.

	Measure of Coals.		Weight of Coals.		Weight of Cinders.		Measure of Cinders.	
COKE OVEN EXPERIMENTS.	Ch.	Bu.	Cwt.	qrs. lbs	Cwt.	qrs. lbs.	Ch.	Bu.
1st Experiment in Ovens with TM coals	0	20	13	3 11½	8	0 22	0	22½
2d ditto ditto with same coals	0	20	13	2 18	8	0 20	0	22½
RETORT EXPERIMENTS.								
1st experiment in 6 Retorts with small coals,	0	10	6	0 0	4	3 5	0	12
2d ditto in 6 Retorts with TM coals	0	10	6	2 15	4	3 20	0	14

XXIII. REMARKS ON HERM GRANITE, BY FREDERICK C. LUKIS, ESQ., OF GUERNSEY, IN REPLY TO ENQUIRIES FROM THE PRESIDENT; WITH SOME EXPERIMENTS MADE BY THE LATTER ON THE WEAR OF DIFFERENT GRANITES. COMMUNICATED BY THE PRESIDENT.

ALSO, EXPERIMENTS ON THE FORCE REQUIRED TO FRACTURE AND CRUSH STONES; MADE UNDER THE DIRECTION OF MESSRS. BRAMAH AND SONS, FOR B. WYATT, ESQ., ARCHITECT. COMMUNICATED BY MR. WM. FREEMAN, A. INST. C. E.

1. OF THE DURABILITY OF HERM STONE FOR BUILDINGS EXPOSED TO AIR?

The Herm granite (sienite) as compared with Peterhead and Moorstone from Devon to Cornwall, is a highly crystallized intermixture of felspar, quartz, and hornblende, with a small quantity of black mica; the first of these ingredients hard and sometimes transparent in a greater degree than that found in other British granites,—the contact of the other substances perfect. It resists the effect of exposure to air, and does not easily disintegrate from the mass when mica does not prevail, but as this last is usually scarce in Guernsey granites, the mass is not deteriorated by its presence as in the Brittany granites, where it abounds, decomposes, stains, and pervades the felspar, and finally destroys the adhesion of the component parts:—*vide* the interior columns of St. Peter's Port church, which is built of it for an instance. The quartz is in a smaller quantity, and somewhat darker than the felspar in colour; the grains are not large, but uniformly mixed with the other ingredients. The hornblende, which appears to supply the place of mica, is hard and crystalized in small prisms, rarely accompanied by chlorite; its dark color gives the greyish tone to this granite, or when abundant forms the *blue* granite of the Vale parish. This substance is essentially superior to mica in the formation and durability of granites for strength and resistance; consequently its presence occasions more labor in working or facing the block, and its specific gravity is increased. The mica is inferior in quantity to the hornblende, and usually dispersed in small flakes in the mass;—it may, with chlorite, be considered rare.

2. Do air and water alternately cause any, and what symptoms of decay?

The compact nature of a close grained granite, such as the Vale and Herm stone, having the felspar highly crystalized and free from stained cracks, seems well calculated to resist the effect of air and water.—When the exterior *bruised* surface of a block has been blown off, I do not know a stone better disposed to resist decay:—if the surface blocks of the island are now examined after the lapse of ages, it will be found to have resisted the gradual disintegration of time in a superior degree, when compared with *large grained* or *porphyritic* granite; when exposed to water and air there is no change beyond the polish resulting from *friction* of the elements. Among the symptoms of decay, disintegration prevails generally among granites, usually commencing with the decomposition of the mica; its exfoliating deranges the cohesion of the grains, and it may be considered then to be the more frequent mode of decay. Desquamation is rare with the well defined granites of Guernsey and Herm, and in buildings I know no instance of its existence.

3. What the greatest age of building, or experience of the above?

The churches of the Vale and St. Sampson, although much of the materials are

French and Alderney, bear many proofs of the remarks made in the last answer; these erections date A. D. 1100—1150. The ancient buildings of decided Herm and Vale stone must be sought for among the old houses in the northern parishes, where they not only encounter the effect of air and water (rain,) but the sea air and burning rays of the sun. Disintegration alone appears going on by slow degrees, but in no case affecting the interior of the stone, and so gradual and general as not to deface the the building materially; indeed, the oldest proofs taken from door-posts, lintels, and arches, have scarcely lost their original sharpness or sculpture. The pier of St. Peter's Port and bridge of St. Sampson's may also be mentioned.

The shore rocks in like manner do not show any material change of surface by wearing; where the force of the tide is strongest, a slight smoothness alone may be observed on the exterior particles, and in many instances each substance possesses this polish *without being levelled down to a face.*

Vale stone on the northern point of Guernsey produces a finer grained sienite than Herm, more hornblende in it, and specific gravity greater. The Herm is somewhat larger grained, but equally good for every erection where durability is the chief point. The *Cat-au roque* stone in the western part of Guernsey must be considered of a different structure to the above: it is a fair and good stone and appears to last well; its schistose texture must ally it to the gneiss series, and I do not know its counterpart in Britain. In color it is much the same as the blue granites, the felspar is brilliant and the hornblende prisms are well defined; there is more chlorite in it and it is easier to work.

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TABLE SHOWING THE RESULT OF EXPERIMENTS MADE UNDER THE DIRECTION OF MR. WALKER, ON THE WEAR OF DIFFERENT STONES IN THE TRAMWAY ON THE COMMERCIAL ROAD, LONDON, FROM 27TH MARCH, 1830, TO 24TH AUGUST, 1831, BEING A PERIOD OF SEVENTEEN MONTHS.

Name of stone.	Sup. area in ft	Original weight	Loss of weight by wear.	Loss per sup. foot.	Relative losses.
		cwts.qrs.lbs	lbs.	lbs.	
Guernsey	4.734	7 1 12.75	4.50	0.951	1.000
Herm	5.250	7 3 24.25	5.50	1 048	1.102
Budle	6.336	9 0 15.75	7.75	1.223	1.286
Peterhead (blue)	3.484	4 1 7.50	6.25	1.795	1.887
Heytor.	4.313	3 0 15.25	8.25	1.915	2.014
Aberdeen (red)	5.375	7 2 11.50	11.50	2.139	2.249
Dartmoor	4.500	6 2 25.00	12.50	2.778	2.921
Aberdeen (blue)	4.823	6 2 16.00	14.75	3.058	3.216

The Commercial Road stoneway, on which these experiments were made, consists of two parallel lines of rectangular tramstones, 18 inches wide by a foot deep, and jointed to each other endwise, for the wheels to travel on, with a common street pavement between for the horses. The tramstones subjected to experiment were laid in the gateway of the Limehouse turnpike, so as of necessity to be exposed to all the heavy traffic *from* the East and West India Docks. A similar set of experiments had previously been made in the same place, but for a shorter period, (little more than four months,) with however not very different results, as the following figures corresponding with the column of "*relative losses*" in the foregoing table will show.

Guernsey	1.000	Peterhead (blue)	1.715
Budle	1.040	Aberdeen (red)	2.413
Herm	1.156	Aberdeen (blue)	2.821

All the above stones are granites except the Budle, which is a species of whin from Northumberland, and they were all new pieces in each series of experiments.

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EXPERIMENTS MADE WITH MESSRS. JOSEPH BRAHAM AND SONS' HYDRO-MECHANICAL PRESS ON VARIOUS SPECIMENS OF STONE.

The following experiments were made with a 12 inch press, the pump one inch diameter, and the lever 10 to 1;—the mechanical advantage therefore 144 × 10 = 1440 to 1. The weights on the lever were added by 7 lbs. at a time;—each addition therefore equivalent to 1440 × 7 = 10,080 lbs or 4½ tons.

In consequence of the smallness of the specimens, the press was filled with blocks to the required height, and with these the surplus effect of the lever was 4½ lbs. at 10 to 1, which strictly should be added to the pressure, but as the friction of the apparatus is equal to the effect of the lever, it is dispensed with in the calculation.

The column containing the pressure per square inch required to produce a fracture, gives the true value of the stone, as the weight that does so would possibly completely destroy the stone if allowed to remain on for a length of time. It should also be observed, that from the exceedingly short time allowed for the experiments, the results are probably too high.

DESCRIPTION OF STONE.		Weight of each specimen.	Dimensions.	Surface exposed to pressure	Pressure required to fracture stone.		Pressure required to crush stone.		
		lbs, oz.	Lineal Inches.	Sup. Ins.	Total to each specimen. Tons.	Per sup. inch of surface. Tons.	Total to each specimen. Tons.	Per sup. inch of surface. Tons.	Average per sup. inch. Tons.
Granites...	Herm	6 6	4 × 4 × 4	16	80.0	5.00	116.0	7.25	4.66
		6 6	4 × 4 × 4	16	72.5	4.53	96.4	6.03	
	Aberdeen (blue)	5 0	4 × 4½ × 3	17	81.0	4.76	85.5	5.03	4.64
		5 1½	4 × 4 × 3	18	63.0	3.50	76.5	4.25	
	Heytor	4 7	4 × 4 × 3	16	67.5	4.22	103.5	6.47	6.19
		4 8	4 × 4 × 3	16	58.5	3.66	94.5	5.91	
	Dartmoor	4 10	4 × 4 × 3	16	67.5	4.22	103.5	6.47	5.46
		4 8	4 × 4 × 3	16	45.0	2.81	72.0	4.50	
	Peterhead (red)	5 5	4½ × 4 × 3½	18	58.5	3 25	94.5	5.25	4.88
		4 12	4½ × 4 × 3	18	45.0	2.50	81.0	4.50	
	Peterhead (blue-grey)	5 3½	4½ × 4⅛ × 3½	18.6	58.5	3.14	85.5	4.60	4.36
		5 4	4½ × 3⅞ × 3½	17.5	45.0	2.57	72.0	4.11	
	Penryn	5 7	4⅝ × 4 × 3	18.5	63.0	3.41	72 0	3.90	3.45
		5 4	4½ × 4 × 3½	18	31.5	1.75	54.0	3.00	
Marbles...	Ravaccioni	5 10	4½ × 4 × 3½	18	78.5	4.35	83.0	4.61	4.30
		5 9	4½ × 4 × 3	18	49.5	2.75	72.0	4.00	
	Veined	5 6	4½ × 4 × 3	18	45.0	2.50	85.5	4.75	4.13
		5 9	4½ × 5 × 3	18	31.5	1.75	63.0	3.50	
Gritstones.	Yorkshire (Cromwell bottom)	12 8	5½ × 5 × 5½	27.5	81.0	2.95	121.5	4.42	3.94
		12 5½	5 × 5 × 5½	27.5	76.5	2.78	95.5	3.47	
	Craigleith	11 10	5 × 5 × 5½	25	63.0	2.52	85.5	3.42	2.97
		11 6	5 × 6 × 5	55	31.5	1.26	63.0	2.52	
	Humbie	17 10	6 × 6 × 6	36	72.0	2.00	81.0	2.25	2.06
		17 3	6 × 6 × 6	36	46.5	1.37	67.5	1.87	
	Whitby	16 10	6 × 6 × 6	36	36.0	1.00	40.5	1.12	1.00
		15 12	6 × 6 × 6	36	36.0	1.00	36.0	1.00	
Valentia slate*	(lamine vertical)	3 3	6 × 3 × 3	9	30.4	3.38	47.6	5.29	5.29
		.....				3.38			

* A few experiments were also made with inch cubes of this slate, placed on their natural beds, the results of which were 5.44 and 5.88 tons respectively, or, on the average, 5 14 tons per square inch of exposed surface, to crush the stone. A trial on a similar small cube with the laminæ vertical, gave 5.98 tons as the corresponding result. The specific gravity of Valentia slate appears to coincide very nearly with that given by Kirwan for Welsh slate.

GAUDALOUPE.—It appears that the volcano on the island of Gaudaloupe is just now in a state of great activity, which has been preceded by ten years of earthquakes, and ejection of lava and volcanic cinders. The eruption began on the 3d of December, at 2 o'clock in the afternoon, with a noise like that of a torrent falling over high rocks. The usual accompaniements attended it, and several mouths or cracks are opened, from one of which have issued fragments of rock, weighing from forty to fifty pounds.—[Athenæum.]

CEREMONY OF OPENING A RUSSIAN RAILWAY.—A letter from St. Petersburgh. of Nov. 21st, says,—"The first Iron railroad in Russia was opened on the 18th. The travelling steam engine, built by M. Hackworth, having got finished, was prepared for the occasion, but was not permitted to commence until religiously consecrated.—At eleven o'clock, A. M., a friar with his attendants, made their appearance at the station at which the train was to start, bringing with them a table, three wax candles, a dish full of holy water, and a golden cross. After being clothed with their priestly garments, they began to chant, and the priests crossed themselves and various parts of the engine, then took the birch and threw the holy water on the engine, and the crowd of spectators which had assembled to witness the scene. The chief priest then prayed that the emperor and family might be preserved, that the engine might be fortunate and do much good; this, after pronouncing the benediction concluded the ceremony, which lasted about three quarters of an hour. The candles were then removed, and the engine commenced with a train of carriages, and proceeded from Paulowsk to Kowzmino and back, much to the satisfaction of the spectators, and the Grand Duke, who rode on the train during the journey. The Emperor's attention was attracted by the magnificent appearance of the iron horse, and he was much gratified with the success which had attended their first attempt at this new mode of conveyance."

From the Baltimore Farmer and Gardener.

A NEW MOTIVE POWER.

BALTIMORE, April 8, 1837.

MR. ROBERTS—When I stated to you the fact of an intimate acquaintance of mine having constructed a machine of almost unlimited propelling power on the Hydrostatic principle, you were so much pleased with the account as to request a communication from me for insertion in your periodical; with that request I cheerfully comply.

The inventor of this wonderful and useful machine is Mr. Theophilus Corbyne, an eminent vetinarian—a native of Scotland, and now residing in Pittsburg, Pa., who while practising his profession, has for the last seven years employed his leisure hours on this subject and has now the satisfaction of seeing his plan matured by having constructed one of twelve horse power, which comes fully up to his most sanguine expectations

This machine he calls CORBYNE'S HYDROSTATIC PROPELLING MACHINE. In its construction it is too simple to admit of improvement, and as no steam nor heat of any kind is used in its operation, there can be no explosion, therefore in its use life is safe; and should any part break, it is by its simple construction, admirable of speedy repair.

It is applicable to the plough,* and all propelling purposes, and as such it must supersede the use of steam.

A machine of 500 horse power can be worked by one man, and neither its weight or the room required, will be more than one tenth of the steam engine.

We of the present age, entered on a new era when Fulton brought forth his extended scheme in the application of steam to the propelling of boats on water—in which smoke and vapor supplied the place of canvass. The same age is now bringing forth another era in a more useful and extended scale of operation in this discovery of my friend, who is a philosopher and philanthropist in every sense of those terms.

Although our profession has for several years made us intimately acquainted, visiting each other, and conversing freely, for mutual benefit in our profession—yet true philosopher like, he never intimated to me that he was studying the subject, until on his way to Washington, he called on me and showed the model, which is now in the Patent Office.

With my respects, I am, yours, truly,

JOHN HASLAM.

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* The inventor is fully under the impression that a plough constructed on the principles of his machine, will be competent to plough 100 acres of ground a day.

From the London Mechanics' Magazine.

NEW STEAM-BOILER.—Sir,—Having discovered a means of generating steam by a system at once exceedingly powerful, safe, of comparatively light weight and small size, I beg to call the attention of the scientific readers and others of your Journal to its astonishing power; and to state, that I am desirous of relinquishing wholly, or in part, my interest in its use. A 60-horse power-boiler will measure 2 feet 6 inches long by 1 foot diameter, and will weigh under 2 cwt.; a 600-horse power will measure 6 feet long by 4 feet diameter, and will weigh under a ton. Incredible as these results may appear, they are quite certain, and rest upon well-known principles; and is, therefore, for locomotive-engines and steam-navigation particularly, highly valuable.

I am, Sir,
Your obedient servant,
G. L. SMARTT.

Enfield.

BRIDGE BURNED.—On Thursday afternoon the Railroad Bridge across the North Ana River, on the road from Richmond to Fredericksburgh, Virginia, caught fire, and the wood work was entirely burned. This accident will cause no suspension in the travelling on the road.

IMPORTANT EXPERIMENTS WITH CANAL BOATS AT HIGH VELOCITIES.

We extract from the *Edinburgh Advertiser* the annexed account of some experiments, which prove that high velocities are attainable by properly constructed vessels, upon canals, or narrow waters, without raising a great wave, and consequently injuring the banks;—

"We regard the experiments described below as extremely important. If the result is correctly stated, and if no counteracting disadvantages has escaped notice, we think these experiments may be said to have added a million sterling to the value of canal property in Great Britain, since they must, at no distant period, add fifty or a hundred thousand pounds to the annual dividends. Nothing can be more paradoxical or startling in appearance than this result; and yet our knowledge of the many unexpected truths in mechanical science which experiment has brought to light, will not permit us to reject it as incredible.—It is this:—*that the surge generated in a canal by the motion of a boat, and which is so destructive to the banks, in moderately rapid motion* (such as four or five miles an hour,) *ceases altogether when a high velocity is emplyed.* It is true the vessels were of a particular construction, but this is immaterial. A boat sixty feet long and six feet wide, is capable of being extremely serviceable, both for the conveyance of goods and passengers; and if a boat be safely and conveniently dragged at the rate of nine or ten miles an hour upon our canals, passengers by this species of conveyance will then be upon a level, as to speed, with those who travel per mail. The great recommendations of canal carriage at present are, its cheapness, and the liberty of locomotion which passengers enjoy. Its leading disadvantage is its slowness; and this is now felt more and more, when our stage coaches are touching a speed of ten miles an hour, which will soon be doubled on our railways. We have not technical skill enough to know what a gig-boat is; but we infer from the other particulars stated, that it must be flat-bottomed in the cross section, pretty well curved upwards at stem and stern, and very light. With this form, the quicker it is moved, the less water it will draw. At a very high velocity, it will merely skim the water as it were; the displacement of the fluid will reach only a few inches down; and this circumstance, with the quick motion of the boat, causing a readjustment of the equilibrium of the water equally rapid, the necessary time will be wanting for the motion to propagate itself beyond the narrow zone of water which immediately encompasses the boat. Such is our hypothesis, supposing the fact to be as stated. We have a strong impression however, that the result depends chiefly on the form of the boat, and that a much greater depth than five feet will be no material disadvantage except where the canal is extremely narrow.

"Some months ago, by the suggestion of Mr. William Houston, of Johnstone, the committee of management of the Ardrossan and Paisley canal were induced to make certain experiments for ascertaining the rate of velocity at which a light gig-boat might be propelled along that canal. The experiments were made with a gig-rowing boat of about thirty feet in length, constructed by Mr. Hunter, boat-builder, Brown-street, Glasgow; and this boat with ten

men on board, was drawn along the Ardrossan and Paisley canal, in the space of less than ten minutes, without raising any surge or commotion on the water—the force employed being one horse, rode by a canal driver. No account of this trial has ever been given to the public, but it was so satisfactory as to induce the committee of the Ardrossan canal to contract with Mr. Wood, of Port-Glasgow, for a gig-shaped passage-boat, sixty feet in length, and five in breadth, fitted to carry from thirty-six to forty passengers. In the month of April last, a number of experiments were made in the Forth and Clyde canal with two gig-boats fixed together, constructed by Mr. Hunter, and thus forming what is called a twin-boat. The object of these trials was to ascertain the rate of speed at which vessels might be propelled along that canal, and the effect of a light double or twin, boat, in giving that degree of steadiness which it was apprehended would be so much wanting in a light single boat. A statement of these experiments on the Forth and Clyde canal has already appeared in the newspapers, and the only fact therein mentioned, which it seems necessary to repeat here, is the remarkable circumstance, that the quicker the boats were propelled through the water, the less appearance there was of surge or waves on the sides of the canal. The result of the experiments was so satisfactory, that a twin boat of a gig shape, sixty feet in length, and nine feet broad, was built by Mr. Hunter, Brown-street, Glasgow, and launched in the Forth and Clyde canal, in the course of the following month.

"The single gig-shaped passage boat contracted for by the Ardrossan canal committee, was launched at Port-Glasgow, on Wednesday, the 2nd of June, and she was towed up to the Broomlaw, and thence carried to Port-Eglington the day following; and on Friday, the 4th of June, a trial, of which the following is an account, took place. The boat is sixty feet long, four feet six inches breadth of beam, and drew on an average, including a deep keel, ten inches when light:—

"From the great hurry in which this trial was made, it was done under many disadvantages. The boat started from Port-Eglington for Paisley, a few minutes after one o'clock, with twenty persons on board, and the distance from Port-Eglington to Paisley being seven miles, was accomplished in one hour and seven minutes. The rider was ordered to start and proceed the first mile or so at a very moderate pace but even at this moderate pace the wave raised in front of the boat was very considerable. A high wave was seen on the canal preceding the boat, about eighty or ninety feet in front, and in some cases farther, and causing an overflow at the bridges and in the narrow parts of the canal. The surge or the cutting wave behind the boat was, however, comparatively slight, and except, the curves, would not have caused much injury to the canal banks. The horse was very much exhausted when he got to Paisley though by no means so exhausted as he was about the middle of the journey, having sensibly recovered after the first four or five miles.

"Two post horses were hired there; and lighter towing lines being attached to the boat, it started again, on its return to Glasgow, with twenty-four persons on board, four of whom were boys, and arrived at Glasgow, a distance of seven miles, in forty-five minutes. The greatest speed attained during the journey, was two miles in eleven minutes. During this voyage the surge behind was entirely got quit of, even at the curves, where it was reduced to nothing; and there was no front wave except at the bridges. It appeared only at the bridges, and just as the boat was about to enter under the bridge, and disappeared as the stern of the boat cleared the bridge. *The quicker the boat went the more entire was the disappearance of all waves and surge*, except where the water escaped in the centre of the canal, and met in two very noisy and rapid currents from each side of the boat at the rudder. This noise and rush of water was so great behind as to induce persons on board to look round expecting to see a great wave or surge on the banks of the canal, but on the banks there was hardly a ripple. The two rapid noisy currents seemed to be completely spent and exhausted by the shock of their concourse behind the boat. Here, therefore, there was no room to doubt the correctness of the reports of the Forth and Clyde canal experiments. It was not merely to be said, that the greater the speed the less the surge or wave, but it was demonstrated that, *at a high rate of speed surge and wave were done away with altogether.* Unluckily, there was no dynamometer attached to the rope, so as to ascertain whether, contrary to all theory, the strain or pull was not, equally with the wave, and the tugging labor of the two horses, lessened instead of increased, by the a celerated rate at which they drew the boat. There can be no doubt, however, that with one trained horse properly attached, the distance could be done in a period under forty minutes.—Contrary to expectation, Mr. Wood's boat was quite steady in the water, and by no means crank. It may be proper to mention that the Ardrossan canal is throughout very narrow; at the bridges, and many other places it is only nine feet broad. It has a great number of turns, and many of them very sudden.—[Mining Journal.]

From the London Mechanics' Magazine.

TUNNELS.

REPORT ON THE PRIMROSE-HILL TUNNEL ON THE LONDON AND BIRMINGHAM RAILWAY, BY JOHN PARIS, M. D., THOMAS WATSON, M. D., CANTAB., WM. LAWRENCE, ESQ., AND R. PHILLIPS, ESQ.

We, the undersigned, visited together, on the 20th February, 1837, the Tunnel now in progress under Primrose-hill, with the view of ascertaining the probable effect of such Tunnels upon the health and feelings of those who may traverse them.

The Tunnel is carried through clay, and is lined with brickwork. Its dimensions, as described to us, are as follows: height 22 feet, width 22 feet, length 3,750 feet. It is ventilated by five shafts, from 6 to 8 feet in diameter, their depth being 35 to 55 feet.

The experiment was made under unfavorable circumstances. The western extremity of the Tunnel being only partially open, the ventilation is less perfect than it will be when the work is completed. The steam of the locomotive engine also was suffered to escape for twenty minutes, while the carriages were stationary near the end of the Tunnel; even during our stay near the unfinished end of the Tunnel, where the engine remained stationary, although the cloud caused by the steam was visible near the roof, the air for many feet above our heads remained clear, and apparently unaffected by steam or effluvia of any kind; neither was there any damp or cold perceptible.

We found the atmosphere of the Tunnel dry, and of an agreeable temperature, and free from smell or perceptible effluvia of any kind; the lamps of the carriages were lighted; and, in our transit inwards and back again to the mouth of the Tunnel, the sensation experienced was precisely that of travelling in a coach by night, between the walls of a narrow street. The noise did not prevent easy conversation, nor appear to be much greater in the Tunnel than in the open air.

Judging from this experiment, and knowing the ease and certainty with which thorough ventilation may be effected, we are decidedly of opinion that the dangers incurred in passing through well-constructed Tunnels are no greater than those incurred in ordinary travelling upon an open railway or upon a turnpike-road; and that the apprehensions which have been expressed that such Tunnels are likely to prove detrimental to the health, or inconvenient to the feelings of those who may go through them, are perfectly futile and groundless.

JOHN PARIS, M. D.
THOMAS WATSON, M. D., CANTAB.,
Physician to the Middlesex Hospital, and Professor of Medicine at King's College.
WM. LAWRENCE,
Surgeon of St. Bartholomew's Hospital.
RD. PHILLIPS,
Lecturer on Chemistry at St. Thomas's Hospital.
London, Feb. 21, 1837.

From the London Mechanics' Magazine.

EFFECT OF HIGHLY-HEATED METALS ON THE GENERATION OF STEAM—COLORED WATER.

Sir,—My attention having been drawn to the very curious inquiry, which is detailed by Mr. Tomlinson, of Salisbury, in your Number of January 28th, I would beg to make a few remarks thereon.

It appears from the results of Mr. T.'s experiments, as also from his extracts from Pouillet, Baudremont, and Laurent, that a globule of water, when contained in a metallic vessel, evaporates in a shorter time, if the vessel be at or about 212 degrees, than if it have a higher temperature. This is very remarkable, and far removed from the common ideas on the subject; but I cannot assent to Mr. T.'s explanation, so

far as regards the existence of a stratum or bed of steam between the vessel and the water.

We all know that the specific gravity of steam is less than that of air, and infinitely less than that of water. On what principle, then, can a portion of steam exist *beneath* the water? Let us take the analogy of any fluid whatever, and see how far it will bear out the objection.

If we have a vessel of water in process of heating over a common fire, the first formation of steam takes place at the bottom. This *ascends* to a higher stratum of water, and is then condensed and imparts its caloric to the watery particles with which it is immediately surrounded. It is this which so rapidly heats water, for the *conducting* power of water is exceedingly limited.

We constantly observe that the rapidity with which the bubbles of vapor rise to the surface is proportionate to the heat of the water. Now, let us apply this to the case of the heated crucible. Mr. Tomlinson supposes the existence of a stratum of steam under the globule of water, which retards the transmission of heat from the metal to the water; but why should not the law of specific gravity remain in force at high temperature? Why should not the steam—its expansive tendency being still more increased by its high tension—why should it not have the power of darting upwards through the watery globule, in order to gain the level of a lighter atmosphere? We must recollect that the steam is formed from the globule itself, at the lower part of it; and ought, if it exist at all, to ascend to the upper part of the globule, just as the steam-bubbles in a common kettle of water do.

I feel more inclined, of the two opinions, to choose that which attributes the slow evaporation of the globules of water to the rapid passage of heat through it. Extraordinary as such a hypothesis may at first appear, yet we have analogies in physical science which aid such a conception.

A pane of glass, broken by a pistol bullet, is not so much shattered as when broken by a stone moving with perhaps not one-tenth the velocity. If a card be balanced horizontally on the end of the finger, and a shilling placed on it, and if the card be struck sharply on the edge, it will slide away from under the shilling, leaving the latter on the finger; but if it be struck more softly, both card and shilling will fall.*

It would appear that *transparency* consists in a perfect facility in the progress of light, through the pores of any substance. Now, if we suppose that heat is *material*, we may conjecture that the calorific tension, when the vessel is highly heated, is sufficient to overcome the reluctant conducting power of water, and that it darts through the latter by virtue of the velocity acquired by such tension.

I do not wish to give this opinion the air of a theory, but there is one remark of M. Laurent's, quoted by Mr. Tomlinson, which I should much wish to see the basis of a series of experiments; he says that when he used colored water instead of transparent, the water evaporated much more rapidly.

Now, to those readers of your excellent Journal who have facilities of making such experiments, I would beg to observe, that it would be very desirable to know whether a given quantity of water, at a given temperature, evaporates in a shorter time when *colored* or *black*, than when transparent.

Black we know to result from the absorption of all light and colors from that of some of the rays. Now should we find that blackened water absorbs more heat, or absorbs heat more quickly, than transparent water, it would permit some evidence of the analogy between light and heat, and would also assist us in determining whether the rays of heat from an excessively heated vessel do really pass through the water too rapidly to impart much of their influence to it during the passage.

Professor Leslie made some very accurate experiments on the comparative absorptive power of different substances for heat, but I am not aware whether they extended to water differently colored.

Whether metals and water become, at a high temperature, electrically excited with the same kind of electricity, and so repel each other, we cannot at present say; but should such turn out to be the fact, it might furnish us with a reason why the globules of water appear not to be in contact with the heated metal: but be this as it may, it would assist us in the solution of this interesting question, if we could determine whether the same apparent repulsion exists between the metal and *colored* or *blackened* water, as between it and pure colorless water.

At all events, I can scarcely subscribe to Mr. Tomlinson's opinion, that a bed of *steam* exists between the water and the globule.

Your obedient servant,

D.

From the London Mechanics' Magazine.

ON A PECULIAR VOLTAIC CONDITION OF IRON, FIRST NOTICED BY PROFESSOR SCHOENBEIN, OF BALE.

Sir,—The facts contained in the present communication, are not to be understood as laying claim to originality in their leading principles; some of the experiments, however, that I shall have occasion to describe, have never been made, or at any rate, I have never seen any account of them by any one else, and the whole are so extraordinary, and will, in my opinion, eventually throw such light on the rationale of Voltaic action, that I think you will not object to give them publicity through the medium of your Journal. In the *London and Edinburgh Philosophical Magazine*, vols. ix. and x., may be found the original papers of Professor Schoenbein and Dr. Faraday. All the experiments there described, I have attentively gone through, and I shall merely give here such an abstract of them as may be necessary to set the matter clearly before your readers.

Ex. 1.—When iron wire, $\frac{1}{16}$th of an inch in diameter, was immersed in nitric acid, specific gravity 1.379, it was attacked with violence; but when surrounded, or even touched in the acid by a piece of platina wire, action was instantly stopped. The platina was then removed, and the wire remained for any length of time in the acid without any action, and as bright as silver. If it was now taken out, wiped, and again immersed, violent action immediately took place for a moment, but it soon (generally) was again quiescent.

Ex. 2.—If, when the wire was in violent action, it was touched by a piece of platina, the effervescence instantly ceased, but again commenced when the platina was removed. Bringing the two metals a second time into contact effectually stopped the action. If the wire was in a very violent state of effervescence, it was not for some time protected by the platina.

Ex. 3.—If a wire made thus inactive by platina, was touched in the acid by a piece of zinc, or a common iron wire, it was thrown into action: but an iron wire having the smallest piece of platina attached to it, did not throw it into action, being itself inactive. If the platina was now slipped off, and either wire touched once with a common wire, both were instantly thrown into violent action.

Ex. 4.—When the acid was disturbed with an equal bulk of water, platina did not preserve iron wire from its action, even when coiled thickly round it; it appeared, indeed, rather to quicken the action. But though it did not preserve it under these circumstances, it did under others which I shall notice presently.

Ex. 5.—Half a wire, four inches long, was heated to dull redness, the blue tinge extended through three inches when the wire was cold, and these three inches were quite inactive in acid specific gravity 1·379, the other inch was active; when the heated end was made bright by filing, it was rendered active, showing the former inactivity to be owing to the superficial coating of oxide.

Ex. 6.—When a wire made indifferent to nitric acid by platina was immersed in the acid, and another common wire dipped into the same vessel, the latter was of course active; but when the wires were made to touch at their parts *above* the liquid, action was excited in the indifferent wire.

Ex. 7.—A common wire was made to touch an indifferent one, and both dipped into the acid, the *indifferent* one going in *first*. By this means, the common wire was made indifferent, not being in the slightest degree acted on by the acid; the second wire rendered indifferent a third, the third a fourth, and so on. This experiment succeeds best with wire that has been made indifferent by platina, but with care it will answer equally well with wire that has been made indifferent in the fire; the conditions appearing to be perfect con-

* The acknowledgment of such a principle is conveyed in the story of the Turkish headsman, who was so dexterous in the use of his scymeter, that he could cut through the neck of a culprit *without disturbing the head*, when he moved his scymetar with great swiftness.

tact, and gradual immersion. When these wires were taken out of the acid and wiped, they always returned to the active state, but were again made indifferent by repeating the process.

Ex. 8.—A wire, polished very bright, was protected by platina, and immersed in a solution of nitrate of copper, and nitric acid, which acted very strongly on common iron, copper being deposited on the metal: the protected wire *remained, however, bright.* After remaining a few seconds the platina was removed, the iron instantly became as common iron, but when the platina was allowed to remain in contact an hour or two, and then removed, the wire was left in the peculiar state, exhibiting the curious phenomena of a piece of polished iron being quite inactive in a solution of nitrate of copper and nitric acid. The wire thus inactive, on being touched by a piece of common wire was instantaneously rendered active, undergoing rapid solution, and becoming covered with a crust of copper.

Ex. 9.—A piece of iron was protected by a piece of platina, and immersed in nitric acid; the platina was then withdrawn, the iron remaining in the peculiar state. A piece of common iron was then bent into a fork, and slipped down the inactive wire into the acid, by which it was itself rendered inactive. Now if another piece of iron was made to touch the fork *before* being introduced into the acid, it was rendered itself inactive; but if it was first thrown into action, and then made to touch either end of the fork, it threw all the wires into action. This is rather different from the result obtained by Professor Schoenbein. He describes that end of the fork that was touched, being *alone* thrown into action, the other remaining in the peculiar state as long as the first wire was kept in contact with the bend, but when that was removed both ends became active. The Professor's experiment was made with an oxydised wire. I found it difficult to reduce the fork to the peculiar state with such a wire, but when I accomplished it the phenomena were similar to those just described. I should much wish this experiment to be tried by others as I am at a loss to understand whence this disaccordance should arise.

Ex. 10.—When an active wire was connected with one of the cups of a galvanometer, and a platina wire with the other cup, and both wires dipped into nitric acid, momentary action took place, and an electrical current was shown to pass from the iron to the platina through the fluid, the latter metal becoming positive, but the action soon ceased, the platina protecting the iron, though not in actual contact with it; when chemical action was stopped, the electrical current was stopped also.

Ex. 11.—When the iron wire was connected *first* with the galvanometer, and the circuit completed by putting it into the acid, the platina wire having been previously arranged, no action, either chemical or electrical, took place. The same was the case if a wire, having been previously made inactive, was substituted for the platina. Now when platina was used, the moment the circuit was closed, bubbles of gas made their appearance on the platina, and if an iron wire was used, having a small piece of platina foil or wire attached to it, the bubbles formed on all parts of the foil, but none made their appearance on the iron. If then the platina foil was removed, the bubbles made their appearance on the iron, which sometimes also went slightly into action.

Ex. 12.—When two cups were employed, being connected by a compound platina and iron wire, all the phenomena which took place in a single glass were observed, and the platina or inactive iron in one glass, exerted a protecting influence on the iron in the other, provided the communication was first made through the galvanometer; a touch from a common wire also threw the iron into action, producing a strong electrical current. The same was the case with three or four glasses connected by a compound wire.

Ex. 13.—When the acid was diluted, so as to have a specific gravity 1·204, platina, as was before observed, could not protect iron from its action; neither when connected with the galvanometer did it, if the iron was dipped in the acid first; but if it was first connected with the galvanometer, and then put into the acid, no action whatever took place in any length of time; on removing the platina, action sometimes took place; it always commenced when the inactive wire was once touched in the acid with an active wire, or with a piece of copper. The wire, thus made inactive, did not possess the power of rendering other wire inactive, but was always thrown into action itself. When a piece of common iron was substituted for the platina, whether it was connected with the galvanometer first or not, the wire in this case acted as platina to the second.

Ex. 14.—When two cups were employed, and connected by a bent piece of wire, and so arranged that the iron wire should be active, on removing the connecting wire, and taking a fresh piece, if it was dipped first into the cup containing the iron, and the other end brought into the platina cup, *that end was in the peculiar state,* and there was no passage for the electrical current, the needle of the galvanometer being quiescent; but when it was put into an active state the electrical current passed. Now here we have the iron made inactive *without any metallic communication with the platina,* and when inactive it is found incapable of conveying a current of Voltaic electricity; an inactive wire could not, in this experiment, be substituted for the platina. This latter most remarkable, and, as I believe, at present, inexplicable fact, has, as far as I know, never before been noticed, but that it is true, any one may in a few minutes convince himself. I have often left the whole arrangement undisturbed for hours, and still, at the end of that time, the end of the connecting wire in the platina cup has been *perfectly bright,* and the needle of the galvanometer stationary in its usual position; but on touching it once with a common wire, it has been thrown instantaneously into action, and then the electrical current has passed, the needle being strongly deflected. I am, at present, occupied in further researches, and I hope something satisfactory in explanation of this dark subject will soon transpire.

I am, Sir,
Your obedient servant,

Near Bath, March 15, 1837.

From the London Mechanics' Magazine.

MR. SIEVIER'S PATENT CAOUTCHOUC CORDAGE.

Sir,—In consequence of a letter which appeared in your valuable journal respecting Mr. Sievier's "patent rope," and the strictures thereon by your correspondent Many-points, I was induced to procure a piece of the said rope from the Company's establishment at Tottenham, prepared and manufactured according to the directions given in the specification by the patentee; it measured 4 feet 6 inches long, and was ¾ths of an inch in diameter, composed of 12 strands, each strand had a slip of India-rubber in its centre. This was placed in the garden in a northerly aspect, and allowed to remain exposed for two nights and days to a frosty atmosphere, uncovered, the thermometer being at the time at 29°. When removed early on the third morning from its Siberian situation, it was found to be pliable and elastic, and its length was the same.

A similar piece was immersed in a butt of cold water, and allowed to remain for ten days; at the expiration of the above time it was removed, and its elasticity, pliability, strength, and length, were found to be the same as when first put into the water. Caoutchouc, or India-rubber, by itself becomes very hard when exposed to the atmospheric air, or when immersed in cold water for any time; but this change does not take place when it is interlaced or combined in any way with good hempen thread—the rigidity is prevented, its elasticity is preserved, and its pliability remains. Perhaps Many points was not aware of this fact.

Hoping the above brief statement of facts will satisfy Many-points, as well as your numerous readers,

I am, Mr. Editor,
Yours respectfully,
NAUTICUS.

March 28, 1837.

From the London Mechanics' Magazine.

PRACTICAL REMARKS ON KEEPING BEES.

Sir,—Having been requested by some person desirous of keeping bees, to give, through the medium of the *Mechanics' Magazine,* my opinion as to the best method of managing these useful insects, I beg to solicit the favor of the following observations being inserted.

I have kept bees nearly twenty years, and practised various plans with a view to gain the greatest produce in honey and wax with the least trouble, but more particularly with a view to the preserving the lives of the bees, and feel confident that the story-fying system, which I believe Wildman practised, is the best. I tried for six or eight years the plan Mr. Nutt advocated, which, by-the-bye, is as old as any of the plans known, but without meeting with any thing like the success of the common cottage hive. A strong

stock in the latter had produced me an early swarm and cast, the swarm producing in a good season upwards of forty pounds of honey, and the cast fifteen pounds, the stock being kept five or six years. The honey thus procured is always of good color, and fit for sale; and when after six seasons the parent stock is destroyed, the honey, being dark, may be used to make mead, or sweeten wine with, a strong swarm being kept to supply its place. This plan requires the destruction of the bees, and is therefore censured as inhuman; but to me is not more so than destroying beavers and cats for their skins, or catching fish to manure the land with; the consumer never considering how produce is procured, and should, therefore, be considered the most culpable, if such acts are breaches of humanity. The hives I now prefer are flat, having wooden tops fixed on with wires. The inside should be twelve or thirteen inches clear, and about seven inches high, the top having a centre hole, and three or four others round it near the outside, each hole being two or three inches diameter, and fitted with nice bungs. If no swarms are wanted, a large glass, or small straw hive, may be put on the top about the end of March, or a small glass to each hole, previously pulling out the bungs, gently turning them round first, each glass having a bit of paper pasted on it, stating its weight when empty; such glasses being kept from the light, by an empty hive being placed over them. Every ten or twelve days they should be examined, and when filled may be removed, and others put on, as long as the season permits. If a stock is weak, a new swarm or a cast may be put on the top of it, and the entrance closed till eight or nine o'clock the following night. These stocks may be preserved seven or eight years, but should be kept in a house or shed; and when the winter begins, the bungs having been replaced, should be covered over with sacking or other warm articles. Glasses may be put on a swarm immediately after hiving them, removing them in three or four weeks, to enable the bees to procure enough for the winter. The boards above mentioned should be made of pine plank, half an inch thick. The bottom boards should be made of the same, one inch or one inch and a half thick, having a piece projecting for the bees to light upon. By pursuing this plan, any number of stocks may be kept with but little trouble, and the bees saved; but the placing the glasses on empty hive early, is essentially necessary.

I am, Sir,
Your obedient servant,
G. L. SMARTT.

Enfield, Feb. 10, 1837.

ON CEMENTS.

A patent was granted to John Henry Cassell, of Mill-wall, for his invention of a cement or combination of materials applicable to purposes for which cement, stone, brick, or other similar substances, may or can be used.—[Sealed April 19, 1834.]

This invention consists in cementing or combining the materials for making roads, and for constructing docks, water courses, foundations, and other similar works, by the aid of coal or other mineral tar, wood tar, and resinous matters, or the products of tar, in the manner hereafter described; and thus producing a mass, which may be formed or moulded into any figure, which, when cold, will be exceedingly hard, and be serviceable for the purpose of cement, stone, or brick, in constructing any such like works or buildings, as before mentioned. But in order that this invention may be perfectly understood and carried into effect, it may be necessary to describe the methods used by the Patentee for combining such materials together, and applying them to the aforesaid purposes. A quantity of tar, such as is produced by the distillation of coal, shale, or wood, is first taken, and by further distillation the aqueous parts are separated therefrom, and thus the tar or resinous substance is reduced to the consistency of treacle; this is called the first product, the tar or resinous substance being in a thick and adhesive condition when cold. In order to produce the second product, the distillation is carried on still farther, and by this means the essential oil is obtained; and for the third product, the process of distillation is carried on, till the substance becomes so adhesive, that a small portion being removed from the still may be drawn out into threads and when cold, becomes brittle; and for the fourth product, the distillation is carried on still farther, till the substance becomes extremely hard, and will not soften by heat, either of the sun, or any artificial heat. The apparatus or still which is used for this purpose, is similar to that which is called a pitch still, which is well known, and forms no part of this invention, nor does the process of distillation for separating the tar into three products; that is to say, first, tar deprived of the aqueous parts, and reduced to a thick adhesive condition when cold. Secondly, the essential oil. Thirdly, the adhesive tar, or product hereof, which when cold, is hard; and fourthly, the substance not acted on by the heat of the sun. It may be desirable here to remark, that coal tar is preferred, in consequence of cheapness.

The Patentee then proceeds to describe the combining of these products with other materials, in forming a cement or combination in the making of roads, docks, water-courses, and such like works. We will first describe the method pursued in applying this invention to the making of roads, or in repairing them. Having laid out the road, and made the necessary drains for preventing the lodgment of water below the road, the surface is prepared by beating or rolling, in order to compress the earth, particularly when the surface is composed of loose earth, and, by raking, bring the surface to the required figure, that is, with such slopes as may have been determined upon, and make the same as even as possible. The surface is then saturated with the essential oil, (the second product,) in thin layers, allowing time for it to subside. The oil put on in this manner will quickly penetrate the ground: the second operation is then commenced, which consists of spreading over the surface of the earth so prepared a thin coating of the first product, perhaps one-fourth of an inch thick, then let the same be ignited, and permit it to burn a short time. Dry sand, or fine dry earth, or slag, or cinder, or a combination of these, should then be sifted on the tar and oil, to the depth of about half an inch, which will instantly put out the flame. The ground should then be rolled, in order to cement the tar and sand together; and, in order to facilitate the operation, it is found desirable to have a frame of iron, or other material, about three feet square, which is successively placed over the surface of the ground, and thus complete portions of the surface at each operation. By this means, it will be evident that a thin cemented layer or surface will be produced on the road. In some instances, one, two, or more layers of this description may be made on the road, depending on the extent of trafic to which it is to be subjected; but it will be desirable to remark, that the essential oil is only used previous to the first layer. Having thus prepared the under surface of the road, the Patentee proceeds to describe in what manner the same is finished; and observes, that the finishing materially depends on the description of materials, which may be readily obtained at the place where the road or other work is being constructed, such as broken granite, flint, slag, gravel, or any other hard material suitable for the surface of a road. It should be observed that the same should be broken somewhat small, say not larger than three inches, and one-third of the third product should be taken to two thirds of sand, and boil and mix them together; then pour such mixture over the broken materials to the desired depth, which running into the space between the stones, forms a very hard and solid mass when it cools. When the said fourth product is in a melted state, any of the materials, such as sand, stone, &c., may be mixed in an open vessel, in the proportion of one-third of the fourth product to three of stone, sand, &c., by weight, and mix them well together; and when so mixed, the composition is spread over the surface of the road from one to four inches deep, or more if it is thought necessary, the road being prepared as before described; this is then rolled so that as even a surface as possible will be produced; by which means a hard surface will be formed, which will wear exceedingly well, and produce a cheap and lasting road. Or where it is desired that the upper surface should be formed of larger stones, or other material, such as broken granite, flint, slag, or other substances, of a size such as is generally used in making what are called Macadamized roads, frames or moulds may be used from twelve to forty-eight inches square, open at top and bottom, like a brick mould; pack in them a number of such broken pieces of material, and then run in a quantity of the fourth product in a melted state, and then fill up the interstices between the stones or other materials, making the upper surface as even as possible. These materials, when left in the moulds till they are cold, will be stronly cemented together, and be ready to form the upper surface of the road, they should be put on in the following manner; having prepared the road, as above described by the essential oil, with the first product, and the sand or fine earth, a coat of the third product of the tar should be spread over to about the thickness of one inch;

then, while the third product is warm, cover the road with the moulded materials, placing that part which was uppermost in the act of moulding, on the surface of the road prepared as above, and by rolling or pressing cause the moulded parts to adhere firmly together, by this means, rather a rough surface will be produced, suitable to the tread of a horse. The first preparation is also used to cover good Macademized or other roads, which firmly cements every stone into its place, prevents the wheels from ploughing up the roads, the water from softening the substrata, and preventing mud and dust from rising. The third product is also used, when in a melted state, to pour between the joints of street pavement, in the manner that grouting is now performed: this will cement every stone together, and so prevent water from getting beneath the stones to the sub-soil, or rising therefrom. If the sub-stratum is of a soft substance, or the street is required to be very durable, the ground is first prepared, as described in the first process: the paving stones are then saturated with essential oil, and the third product is then run between the joints of the stones or bricks that are required for foundations. The resin of wood is used for making stone and cast figures, that are required to be of a yellow color; sand of the required color is added, as in the fourth process. In some instances, instead of moulding such larger pieces of flint stone, or other material, sand, or fine earth, is mixed with the fourth product when in a hot and melted state, and the composition is moulded, as above described: such materials being very suitable for foot paths, water-cisterns, pipes, and a variety of other useful purposes.

Having thus described the nature of the invention, as applied to roads, the Patentee proceeds to describe its application to canals docks, water-courses, and such like works. The earth being excavated, and the slopes of the banks made to the intended figure, the next process is to beat the surface of the earth; and in order to render the same as compact as possible, it is saturated with the essential oil, as before described; then a thin layer of the first product of the tar is run over and ignited; after that, sand, or any other dry earth or material, is sifted over, as above described. Three layers of these cemented materials will be sufficient when applied to the usual slopes for canals and water-courses, and will offer a compact and close surface to the water; which will protect the banks from the prejudicial washing to which they are otherwise subject, and consequently be of great utility when quick travelling is required, or when the canal boats are propelled by machinery. In forming the embankments of docks or quays requiring steep or perpendicular walls, a much stronger facing is required, depending on the depth of the water they are to support, and also the description of ground behind.

The Patentee proceeds to state that a framing of wood is usually constructed to the desired thickness; and having previously made a good base or foundation of a combination of the fourth product of the tar, with broken stones, or other rough hard materials and sand or earth, he continues melting and mixing quantities of the fourth product of tar with broken stones and sand, in the proportion of about one of the fourth product to three of the stones and sand, or other material, and successively throws them into the frame, and levels and beats such concrete mixture, till the frame is quite full to the surface of the intended finish of the wall, which is usually made to lay on the surface of the earth. It would be advisable to remark, that between each quantity of the material thus put into the frame, it is found desirable to spread over a thin coat of the first product of the tar, and ignite the same, in order that the surface of the last quantity should be in a melted state, to receive the next quantity of the material. It will be evident, from the above description, that piles, and also landties, may be built in the walls, in order to give additional strength to them; and that where frames or moulds are used, they are washed over with a covering of white-wash or of clay, by which means the composition does not adhere to them.

The Patentee concludes by saying, that having thus described the nature of his invention, and the manner in which the same is performed, he would have it understood that he does not claim any of the materials separately; and it will be evident that the means of carrying the same into effect, may be varied to suit the particular object to which the invention is to be applied: but he would have it understood, that what he claims as his invention, is the cementing or combining the materials for making and mending roads, and for constructing docks, water-courses, water-tanks, pipes, and such like work, by the aid of tar and resinous substances, or the products thereof, as above described.—[Lond. Jour. Arts and Sciences.]

From the Mechanics' Magazine.

AN IMPROVEMENT IN THE CONSTRUCTION OF CHIMNEYS.

I have thought that an improvement would be made in the construction of chimneys, by building the flues circular instead of square. By a plan which I shall describe, the inside of the flues might be made much smoother with less trouble than the square ones are now made, and might be carried up with less variation in the size.

My plan is, to mould brick clay into pieces about 24 or 30 inches long (or any length most convenient in using,) about two inches thick, and shaped like half of a hollow cylinder, divided from end to end. When the fire-place is built, the flue should be brought to its size in a circular form, sufficiently large for the free passage of the smoke. The outside of the chimney being carried up a few courses, two of the half tubes are to be put on as a continuation of the flue, with mortar under the ends on which they stand, and between the edges which come together. They will thus form a circular tube, which should be of the same diameter as the flue where they are put on. Where the flue bends, it will be necessary to cut the ends of the pieces, so that they will make an angle, when put together, in the same manner as the joints of a stove pipe. When the tops of the pieces come even with the outside course of bricks, they migh. be tied by thin pieces of iron plate, such as are used for binding the fronts of walls to the inside work. The advantages of this plan, I think, are, the flue has a shape which I believe is considered the best for carrying smoke; the inside is smoother than the square ones usually are, and it therefore presents fewer impediments to the passage of the smoke; the chimney might be cleaned easier than the square ones, for a circular brush passed up and down, by means of a rope, would sweep well and quick, and the chimney-sweep might thus be spared his labor inside of the flue. I should think the expense would not be more than that of the square flue, after the brick-maker had got the necessary tools, and had had some practice in the manufacture of the flue pieces.

If you or any of your readers are disposed to examine this plan, and show its defects, or improve it in any way, I shall be glad to read their opinions in your next, or as soon as convenient. A. H. W.

ON THE CALCINATION OF ORES.

A most simple method for effecting this process is practised at the Iron works in Staffordshire, as well as at some of those in Scotland and Wales. It consists in spreading the ironstone intended for calcination over a bed of coal about a foot in thickness, adding occasionally a layer of small coal, until a heap is raised about eight or ten feet in height, and fourteen or fifteen in diameter; the fire is then lighed, and the operation left to itself without any further attention. The open fires vary, however, in their form. Another, and more economical mode is used in South Wales, by which the refuse coal and coke are consumed in ovens or kilns, constructed for the purpose.

The form of the interior is, usually, a reversed cone or pyramid; those which approach to an oval being also held in much esteem. The oven, or kiln, being first charged with coal and ironstone, but not entirely filling it, when the fire begins to reach the upper part, small coal is thrown on alternately with the ores, until the kiln is filled. The lower part is then drawn out and left to cool, as in lime burning; the kiln is recharged, and the process continued indefinitely.

In Wales it is generally contrived to erect the blast furnaces on the side of a hill and the calcining ovens are built on a terrace surrounding it, to the height of the furnace mouth: the time for the operation is regulated so as to keep a supply only to the quantity required for smelting. At Newcastle-on-Tyne a similar method is practised, but the fuel consists of small coke.

At Bradford the ovens are rectangular, and about twenty-five feet in depth, fourteen long, and five wide, in the upper part; towards the middle it takes the form of a truncated pyramid, whose base is about twenty inches diameter: small coke is used here also: at other works in the same vicinity the ovens are of a similar shape to the furnaces, and about fifteen feet in height.—These dimensions are, however, exceedingly variable, both in different counties, and sometimes in the same establishment.

At Pouldice, in Cornwall, the tin ores are roasted, to facilitate the subsequent separa-

tion by washing. The furnaces for this purpose have a fire place about one foot by four feet, on the same level as the part destined for the ores, and only separated from it by a course of bricks placed flat, the furnace bed is about nine feet six inches by eight feet; the height of the roof one foot; its course nearly horizontal. In the front of the arch, near the door, is a vent, which, after rising vertically, takes a course nearly horizontal, and discharges itself at the distance of a quarter of a mile into a large chimney, the upper part is formed of flat stones, which are easily removed for the purpose of clearing out the arsenic accumulated on its sides, which is sold for 10s per ton; on the outside of the furnace is, also, a projecting or forge chimney, rising about fifteen feet. Similar precautions, favorable to the health of the workman, are in use in all the tin works throughout England, which have not yet been introduced into Germany. The charge of this furnace is six cwt., requiring 1½ bushels of charcoal to each roasting; this is, however variable, as well as the duration of the process, according to the nature of the mineral acted upon.—[Lond. Quar. Mining Review.]

MEMOIR ON THE CALCINATION OF COKE.

Abridged from the Report, by Messrs. Perdonnet and Leon Coste, in the Annales des Mines.

Coke is obtained in England by two distinct processes; in the open air, and by means of ovens constructed for the purpose. The former is the method usually adopted, the latter being applied almost exclusively to the small coal or slack. In the vicinity of Dudley, in Staffordshire, all the coke is made in the open air; the process consists in forming a small conical chimney, with bricks placed in such a manner as to leave spaces between them, these openings are larger in the lower than in the upper courses, the usual height is about four feet six inches, surmounted by a cylinder of one foot. The coal is then disposed around the chimney, the largest lumps being placed first to form the base of a cone, after which more is thrown on the heap, until the top is above the level of the brick work; the whole surface is then covered with slack, with the exception of the lowest part of the heap, to about one foot high, the fire is then lighted in the chimney at a certain period of the operation the remaining part is also covered with slack, and when the carbonization is judged to be complete the fire is extinguished, by throwing on a sufficient quantity of water and dispersing the materials of the heap.

The dimensions of the coke heaps vary considerably, they are most commonly fourteen or sixteen feet in diameter, and contain about twelve ton of coal. From the time of lighting the pile the operation is completed in seven days, three for the calcination and four for the extinction and subsequent cooling of the mass.

It would appear that a method so simple as this would be invariable in the results nevertheless the contrary is the fact, much depending on the attention and judgment of the burner or superintendant. A ton of coal usually yields twelve cwt. of coke, or sixty per cent. sometimes ten cwt. or fifty per cent. from the same materials. In South Wales both methods are practised, but the coke is not calcined with so much attention as in Staffordshire, the process differs in the heap being made in the form of a long bank four to six feet in breadth, and about three feet high, the large coals in the middle, and the fire being lighted either at one end or at several parts of the heap. At Pontypool and Abergaveny the coke is calcined in the open air; the coal in some parts of this district bears a resemblance to charcoal, in converting it into coke great care is taken to preserve this entire, the operation is completed in five days. In the neighborhood of Merthyr Tidvill the process is conducted in the open air, and although very little care seems to be given to its progress, yet a considerable quantity of coke is produced, the coal being generally dry and giving but little smoke. At Plymouth works six tons of coal yield five tons of coke; at Dowlay 720 lbs. of coal yield from 450 to 500 lbs. of coke; at Pen-y-Darran the operation lasts only three days, the increase in bulk being also very considerable, three tons of coal producing twelve barrows of coke, each containing seventeen cubic feet, or above one-fourth part more than previous to calcination.

At Neath Abbey the carbonization is more rapid than in any other place, it being finished in nine hours, producing rather less than sixty per cent. of coke. In Scotland calcination in the open air is generally adopted; formerly the heaps were burned without much attention being paid to their progress, but the Staffordshire mode has been used latterly with great advantage, the heaps consisting of eighteen tons of coal, well covered with slack, kept burning three or four days, and four or five days more being allowed for the cooling of the mass, the loss in weight is about fifty per cent.; the old method occupied only five days, but the loss amounted to from sixty to sixty-six per cent. The coke is of very unequal quality, some parts being very heavy and others light and porous. In Yorkshire the coal is arranged in long banks six feet wide by two and a half high, with square vertical chimneys, eight or nine inches in diameter, formed with large coals, at about the distance of six feet from each other throughout the length; the loss is about fifty per cent. in weight.

Calcination in ovens is considered to produce a heavier coke than the open calcination; the process varies but little, being in all cases performed in ovens of a circular or oval form, with a low arch surmounted with a small chimney, the furnace has two doors or openings opposite to each other, sliding in a groove and raised by a lever, they are usually of cast iron, the dimension of the furnace about twelve feet by six; height of the arch in the centre five feet, at the door twenty-one inches; the chimney rises three feet externally and about nine inches in diameter. At Neat Abbey the furnaces are smaller; the chimney is eighteen inches externally, and only one door, but in this case a hole is made in the opposite side to facilitate the clearing out of the coke. From the small coal carbonized in this manner the produce is about sixty per cent. while the same quantity of coal in the open air yields but fifty per cent. the coke from the furnace being so much more dense. At Swansea, by the same process, the produce is about fifty-four per cent.

In the vicinity of Glasgow a circular oven with one door is in use, the diameter is nine feet, height of the arch six feet.—The coke is drawn out every twenty-four hours; the ordinary charge, one ton and a half of coal, rising about two and a half feet in the oven, the loss is from fifty to sixty per cent. On Saturdays the charge is increased to two tons, and is not withdrawn until the Monday. At the Lymington works, near Newcastle-upon-Tyne, all the coke is made in ovens, the usual charge is one chaldron of about two and a half tons, the operation lasts forty-eight hours, and the average loss thirty-nine per cent. The coke is screened to the diameter of about one inch, for smelting in the high furnace, the smaller portion being employed in roasting the ores. At Bradford, in Yorkshire, the method is similar to Newcastle, but the furnaces are smaller, the charge being only about one ton, the loss is about forty per cent. It is difficult to decide to which process a preference ought to be given, the loss is less in the ovens, but they require more space, more attendants, and more expense, while the open carbonization is considered to yield coke better adapted for smelting in the high furnace.—[Lond. Quar. Mining Review.]

Agriculture, &c.

From the New-York Farmer.

The following article was designed for the May number, but it did not reach us until that number had been forwarded to subscribers. In relation to the *hoe* referred to, we shall be pleased to show a sample of them at this office.

BURLINGTON, N. J., WEEDING HOE. This instrument, which is an improvement of the hoe, passing by the several names of "French or Dutch Weeding Hoe, Shuffle, and Lazy-back," was invented about twenty years since, by Mr. Nathan Stowell, of this place, and has within a few years past, been introduced into the gardens of Horace Binney and Charles Chauncey, Esqrs., Henry Carey, Haverford School, and many others, and is highly approved of wherever known. Setts of these hoes may, probably, be procured of Geo. Thorburn, No. 11 John-st., New-York, who has been furnished with a sett as samples for any good smith to imitate. In making them, care should be taken to punch rivet-holes through the sawplate *without heating it*, so as to retain the temper of the plate. Both this hoe, and the Burlington hand "Weeding Fork," are worthy the attention of Gardeners.

T. C.

Burlington, N. J.

From the New-York Farmer.

We are truly obliged to M for this continuation of the subject commenced in our last. His views, opinions and experience, are entitled to high respect.

MANAGEMENT OF SHEEP.—No. II.

MESSRS. EDITORS,—With your approbation I will resume the above subject, commenced in your last number. In that communication I endeavored to establish the first, and most prominent advantage, derived from adequate protection afforded to sheep during the winter season, viz., *the saving of life.* I shall comment further on this head, and mention other advantages, founded upon my own experience, although fully confirmed by the experience of thousands before me. I arrogate to myself no claim whatever for any new discoveries, but merely have followed the lights which others have discovered and set up: my object is, only, to bear testimony to the correct bearings of those lights, and assure all my agricultural brethren that they will invariably lead to the harbor of *true interest.* I know to well, from my observations, that the proclamation of a truth, and that sounded but once, is like the fall of a solitary drop of water upon the rock,—it is only by its thousand repetitions that an impression is made. Having this in view, it serves as my only foundation for hope that my reflections, trite as they are, yet having the merit of being based upon facts, will not be altogether passed by like the idle wind. We have indeed fearful and gloomy times upon us already, and a dull prospect of immediate amendment, and it therefore behoves every farmer to be awake and diligent in every department of his calling. Our duty is to practice economy; not simply that economy which, according to common acceptation, consists in saving shillings and pence, but adopts all wise and salutary means for saving our stock from premature death.

In my former communication, I stated that the severe winter of 35 and 36 caused a destruction of sheep in this quarter which was unprecedented,—that many with flocks similar in size to my own, lost hundreds upon hundreds, while my own loss, in consequence of being well provided with shelters, was only 38 out of 1500—that previous winters, and when my flocks were exposed, my loss varied from 50 to 150. As the foddering season is over, (truly a long one has it been,) and my sheep turned upon the fields, I will state the result of last winter's operations. Of lambs, having wintered nearly 500. I have not lost one. They were grained from the time they were put in winter quarters to the 25th ultimo; and here I will with pride state the fact, that for the number, as regards uniformity of size, and good flesh, their equal will hardly be found in the state Of grown sheep, out of 1300, 17 have died six or eight of which was from old age. This, a thorough and critical wool-grower will not allow is good management, in permitting *old sheep* to die on my hands. I admit it; and my practice is, to select in the fall all inclining to old age and poverty, and put them by themselves, and in the spring or early in the summer, make sale of the flock with their lambs. The few of this description which died, were reserved last year on account of their fineness of fleece, and a wish to retain their lambs.

But, this inquiry will perhaps suggest itself to some sceptical readers of your Journal, whose self-sufficiency causes them to regard their own mode of management superior to every one else, and who perhaps think sheltering of sheep, among other things, mere *fudge*, viz.. whether my sheep were not in better flesh at the beginning of winter before the last, when so many of my neighbors lost their hundreds upon hundreds, while my own loss was less than forty? and further, were mine not naturally more hardy? I answer, that I saw parts of several of the flocks mentioned, late in the fall, and then they were fully equal in flesh to my own; and also, that they are the same grade of sheep, and therefore no material difference of constitution. I call my own flock *Saxons*; but some of your readers, will better understand their grade, by naming the price I have obtained for their wool. It has been purchased in Boston for the Middlesex Company the last three years: the two last clips I received a little less than 75 cents per pound. So it must be the legitimate conclusion, drawn from all the facts I have stated above, and in my former communication, that in *saving of life*, my success is almost entirely to be ascribed to sheltering.

I will now briefly speak of another advantage, or rather consequence, resulting from protection of sheep; viz., *the prevention of disease.* I know it is difficult to get at facts to prove this; but your readers perhaps can gather the proofs of my position, as I have satisactorily done, by reasoning from analogy,—from "man to brute." Will not exposure to the rude storms of winter and spring have a tendency to engender disease?—and if not active disease, will it not so affect the constitution that it is liable to curtail several years of their existence? Every candid and experienced wool-grower will answer in the affirmative. I leave, nowever, what is in some measure speculation, and turn to facts—for facts are truly stubborn, and I like them the better for it.

If there be any who doubt that sheltering of sheep will perfect and improve the quality, I will suggest a cheap method by which t can be thoroughly tested. Select in the all two sheep of equal quality, as regards vool; jacket one of them, as it is called, by covering the body of the animal with an oiled or painted canvass, in order that it be impervious to rain, and let it be kept on, until shearing. Allow the other to go at large, without jacket or shelter, and the result, after comparing the two fleeces, will clearly establish the point in question. But the improvement of fleece is too important to be passed over lightly: I will, therefore, having my Invoices at hand, give the result as stapled in the Middlesex Manufactory at Lowel, exhibiting the clips of '35 and '36. It will be remembered I stated, that, the winter of '34 and '35 my sheep were not sheltered. I sheared about 200 more in '36 than in '35, and those I disposed of during the interim of the clips, consisted, mostly of sheep inclined to age and not altogether my coarsest.

Clip of 1835.			Clip of 1836.		
3 lbs.	Wool	extra.	12 lbs.	Extra.	
62½	"	prime	186	"	prime
743	"	1st	1470	"	1st
1092	"	2d	1169	"	2d
1058	"	3d	879	"	3d
260	"	4th	199	"	4th
72	"	5th	37	"	5th
12	"	6th	9	"	6th

By a comparison of the above, it will be observed, that the stapling of the last clip shows a considerable increase of the higher qualities, and from what is above stated it is clearly proved that the difference is mainly to be ascribed to warm shelters.

But want of time urges me to close this communication. I hope I have sufficiently demonstrated to the sceptical portion of your readers the great importance of protecting their sheep from the inclemency of winter. If their own interests, together with what I have represented, based as it is upon experience, will not convince, as well as arouse to action, I know not what will.

May 2d, 1837. M.

Lansing, Tompkins Co., N. Y.

From the New-York Farmer.

HOVELS FOR SHEEP.—Our worthy friend M has favored us with another article on sheep-husbandry. It is a subject well worthy of more general attention than has been usually given to it; and we shall not, *willingly* waive any claim which we may *have* made, or which we may hereafter *make*, upon M, in relation to this, or any other *agricultural* subject, though we shall not hand the drafts to the "District Attorney," even if not *honored.*

HOVELS FOR SHEEP.—No. III.

The reason, doubtless, why many neglect to provide shelters for their sheep dur-

ing winter, is generally to be attributed to the expense. To all those who neglect this important matter on this account, I will suggest a simple and economical mode of building them. When securing hay, if stacked out, build two pens, for the reception of the bottom of the stacks, four and a half feet high, and place them about thirty-five feet apart, in, or nearly, an east and west line. Then take two poles of sufficient length to reach from pen to pen, and rest the ends on the top of each pen; the centre of the poles to be supported by crotches, and well secured in the ground. A sufficient number of rails or poles will then be required to support the straw, which will be necessary for a covering; a plentiful supply of which should be used in order to absorb rain, and prevent leakage. I will also suggest, that the straw ought to be secured by placing a few rails on the top of it, otherwise violent winds will displace it. The rear of the hovel, which of course should be the north side, can be made of boards, and must be perfectly tight; if it is not, snow when drifting will be certain to find its way in, and often occasion the trouble of removing it. If boards can not be readily obtained for the back, racks, made of rails or poles, and stuffed with straw, will answer quite as well, and perhaps rather better, inasmuch, if they are well made, the hovel will be warmer.

I also recommend the erection of several racks, to be filled with straw, called "wind breakers." I will not mention where they ought to stand, as practical farmers know pretty well the point a northwester is apt to bite hardest. Old and partly rotted straw will answer all the above purposes the better. The size of the hovel, as described, is calculated for 100 sheep. M.

Lansing, Tompkins Co. N. Y.

Although not designed for publication, we give the annexed P. S. for the benefit of all concerned.

P. S. I now will mention some mistakes which your '*devil*' made in printing my first communication, which I beg you to correct in your next No. I am a great friend to order, and like things done just right.

You make me say "*created* board fences"—it should be "*erected* board fences"—and following on as printed, "this however *it* the fact"—should be "*is* the fact"—and "*in* the saving of hay"—should be "*is*" &c. And towards the conclusion—printed "*get* so absolutely neglectful"—should be "*yet* so" &c.,—"will not m *preparatory* remarks" &c.,—should be *prefatory*"—"these are the very kind of farmers referred to who *regret* all experiments" &c,—should be "*reject*" &c.—there are some others too small to notice, the first and last are the only ones necessary to correct.

I am afraid, as the more busy season with farmers is at hand, that all your drafts, that is, *monthly* drafts will not be *accepted*. But I have the great cause of agriculture so much at heart, and so much desire its prosperity, that I am willing to contribute my feeble efforts towards its promotion, either by verbal or written, reflections drawn from the great well of experience and truth.

M.

From the Quarterly Journal of Agriculture.

STUDIES IN THE SCIENCE AND PRACTICE OF AGRICULTURE, AS CONNECTED WITH PHYSICS.

Chance may do much in the discovery of facts, and the invention of means, as when Mr. Nutt discovered the only range of temperature at which bees swarm, and the idle boy, by tying a string to the valve of the steam-engine, invented an ingenious mode of making it work without his continual assistance. Yet it often requires much sagacity to turn to beneficial or practical account such discoveries as are made by accident or chance observation, and even men of the highest talent frequently fail in this. Dr. Lister, the celebrated English naturalist, states certain facts with regard to fossil shells that would almost induce a belief of his having had more than a glimpse of some of the most important doctrines of modern geology. These facts, it does not appear that he followed up to any general induction, which was done almost a century after his time, without, it is believed, any hint having been derived from his statement. Lord Kames, in his very clever book, the "*Gentleman Farmer*," by a chance remark, most distinctly shows that he was on the very brink of anticipating the important discovery of the excrementitious discharges of plants into the soil, recently proved beyond all question by the experiments of M. Macaire of Geneva.*

Chance observations, however, though they should be of the greatest importance, are frequently lost, sometimes for want of being recorded, and sometimes from the observer's being incompetent to see their various bearings. Mr. Nutt might have contented himself with merely announcing, in some scientific journal, his having discovered that bees will not swarm except at a particular degree of temperature, without applying it practically, as he has done, to increase the population of the hives by always preventing artificially the natural process of swarming.

Lord Kames, on the other hand, only mentions it as probable, from the analogy of animals, that plants *may* discharge something similar to excrementitious matter, without following up the idea experimentally, to prove or disprove the fact.

A more extraordinary instance may be given from the science of optics, as bearing upon practical subjects in agriculture, in a manner which could scarcely have been imagined by the most fanciful speculator. About a hundred and fifty years ago, the Dutch philospher Huygens, in his observations on Iceland spar, discovered a remarkable property of the rays of light transmitted through it,—a property which led Sir Isaac Newton to suppose each ray to have four sides or quarters causing it to be disposed in a particular manner. Here the matter rested till it was taken up by M. Malus, whose attention was attracted to the subject by one of those rare accidents which a common observer would have passed unheeded, but which, to a master mind like his, was productive of brilliant results. In 1808, while this philosopher was viewing with a doubly-refracting prism, a fine sunset reflected from the palace of the Luxembourg, on turning the prism slowly round, he was surprised to see a very great difference in the intensity of the two images, that which was most refracted being alternately changed from brightness to obscurity at each fourth part of a turning, or as opticians would say, at each quadrant of a revolution. From that period, Malus, Dr. Brewster, Fresnel, Arago, Biot, and others, have discovered facts "so singular and various," in the words of Sir J. Herschel, "that, to one who has only studied the subject of physical optics under its ordinary relations, it is like entering into a new world, so splendid as to render it one of the most delightful branches of experimental inquiry; and so fertile in the views it lays open of the constitution of natural bodies, as to place it in the very first rank of the sciences."

Some general idea of this may be given to the unscientific reader by stating, that when a ray of light from the sun is reflected from a piece of glass, polished metal, or other such substance, it will pass freely through any transparent body, or may be reflected from another surface, even when we turn round the body. But if a ray of light be reflected from plate glass at an angle of 57°, it is rendered altogether incapable of being reflected from the surface of another piece of glass, when turned in certain positions, though it may be reflected in other positions: and further, this ray will not pass through transparent substances turned in certain positions, though, when these are turned in other positions, it will freely pass through. Hence, it has been inferred, that the different sides of the rays of such light, as imagined by Newton, must have different properties in relation to the surface on which they are received, termed in optics the *plane of incidence*, and hence this sort of light is termed *polarized* light, on account of the sides of the rays being supposed to have, somewhat like a magnet, different *poles*. It is necessary to say, that the existence of such *sides* or *poles* is only conjectural, and not proved; but this does not in any way affect the results of the observation of facts connected with the phenomena.

One other property of this polarized light requires to be stated here. When reflected from a surface, the polarized ray is sometimes observed to go to the right, sometimes to the left, and sometimes more and sometimes less decidedly, on account of the nature of the substance used in the experiment.

Now, it is but natural for the agricultural reader, who has accompanied us thus far, to ask, What can all this minute observation and experiment on the rays of light and their polarization have to do with agriculture? Before we have done, we have no doubt that we shall most amply prove, not its mere theoretical, but its strictly practical importance; so that the reader may himself prove the correctness thereof in a very short period.

We are indebted in part for the facts to M. Biot, of the French Academy of Sciences, himself one of the most successful experimenters in the new science of polarization. Taking advantage of the

* Quarterly Journal of Agriculture.

tests afforded by substances polarizing ligh to the right or to the left, M Biot institute a series of experiments and observations fo detecting the intimate constituents of certain vegetable substances, where chemica analysis failed, or at best was only imperfect or uncertain. From his researches by means of polarization, and those of M. Ras pail with the microscope (another application of optics), we are now enabled to ascertain two kinds of facts of the highes importance to agriculturists, namely, *first*, What constitutes the nutritive principles of the food of animals; *secondly*, What constitutes the nutritive principles of the food of plants. The second is not yet quite so distinctly brought out as the first; but M. Biot, we are glad to learn, is continuing his researches. We shall now endeavor to give some account of the important discoveries in question.

Nutritive Principles of Animal Food contained in Grain and Roots.—Towards the end of the 17th century, the illustrious Dutch observer Leeuwenhoeck, in his microscopical researches, examined, among other things, portions of wheat flour, which we now know to consist of a various mixture of starch, gluten, oil, resin, sugar, and gum; and by one of those happy chances already exemplified, was led to make a shrewd conjecture respecting the real constitution of flour made from grain. In the wheat flour he found globules (*globuli farinarii*), each, as he supposed, furnished with a vessel, by which the plastic matter passes in order to produce other globules, —an optical illusion, as has since been shown; but in subsequently studying those globules, he shrewdly asks whether they be not enclosed, as in the case of seeds, in some sort of membrane. "I then," he adds, "used my utmost endeavors to discover the internal hidden make of the globules of meal, wherein, at length, to my great satisfaction, I succeeded."* He describes the grains of wheat as principally composed of those minute globules which are singly transparent, and he closely compacted within a kind of membranes, so exquisitely thin and transparent, that in some places their texture is not to be discerned. M. Biot has said, that Leeuwenhoeck observed the grain of fecula (rather farina) to be composed of a vesicle and a soluble substance, which is its nutritive part, since nothing but the shells or husks are met with in the dung of animals.

Now these observations of Leeuwenhoeck were lost sight of, as that of Huygens had been relative to the polarization of light, till, eight or ten years ago, the subject was taken up by M. Raspail, apparently without being aware of what Leeuwenhoeck had published, and he has so simplified the views of the constituents of the nutritive principles contained in farinaceous substances, as to render them, when conjoined with the researches of Biot, Persoz, Pelouze, and others, of the highest interest to scientific agriculturists.

It may be remarked, in passing, that M. Raspail* endeavors to show that Leeuwenhoeck's observations afforded not even a glimpse of his own discoveries, and that M. Biot has misunderstood or misrepresented his meaning. In the quotation from Leeuwenhoeck above, however, which we have given in Hoole's excellent translation, it will be seen that M. Raspail himself has not translated unbiassedly. Hoole was dead before Raspail's discovery. From the experiments of M. de Saussure, it was believed that he had procured the chemical basis of starch, which he termed *amedine*. This amedine may be procured by boiling starch in a large quantity of water, throwing it on a double filter; and by boiling again the matter remaining on the filter, filtering again, and drying the residue The substance thus obtained, after repeated washings and dryings, is in irregular white, or yellowish-white fragments, very friable, and without taste or smell. M. Saussure said this formed with potass a non viscid solution, was insoluble in water below the temperature of 140°, and did not form a jelly with boiling water. But M. Raspail shows, that what was supposed to be a solution in water at 140°, is only a suspension. Saussure failed most signally in discovering the nutritive basis of starch, which he ought to have sought for, not on the filter, but in the liquid which had passed through the filter.

Berzelius is no less in error than Saussure, when he states, as quoted by M. Raspail (*Chimie Organique*), that starch or fecula is composed of small crystals, which partly dissolve in water at an ordinary temperature. On the contrary, the miscroscope shows, that starch or fecula is composed of shining white smooth globules, quite insoluble in cold water, even when immersed for any length of time.

The globules of starch, indeed, consist of an envelope or shell and a kernel, if it may be so called, of a substance very different,—the chief discovery of M. Raspail, which serves to explain the errors and discrepancies of previous observers; for the envelope is altogether insoluble in cold as well as in boiling-water, and it is only what we shall for the present term the kernel is at all soluble. The partial solubility, therefore, observed by Berzelius, must have arisen from the accidental rupture of some of the envelopes by which means the water could obtain admission to the kernels.

Accordingly, when Berzelius states that starch is dissolved into a mucilaginous liquid by boiling water; Thenard, that fecula combines easily with boiling-water, forming a hydrate popularly termed starch; and Despretz, that, when fecula is mixed with boiling-water, it becomes soluble, and does not recover its insolubility in cold water, when evaporated to dryness,—they all speak vaguely, and in part incorrectly, from not knowing the discovery of Raspail already mentioned. The kernel contained in the globular envelope of fecula, consists of a gum-like matter, which, by the evaporation of its watery parts, becomes hard on exposure to the air. When immersed in water at 122°, the envelope, which is unaffected by cold water, expands, and in boiling-water it bursts, while the kernel is dissolved in the water. When the water is in large quantity, the envelopes detached from their kernels, and now ten times their original size, having free motion, subside; but when the quantity of water is small, they become mutually entangled, form jelly-like strata or layers, and render the water thick,—being what is termed starch in the laundry (*empois*).

M. Raspail, from numerous experiments, concludes, that each grain of fecula is an organized globule, formed in the interior of living vegetable cells, such as in those of a grain of wheat, or of the tuber of a potatoe; that the enveloping membrane of the kernel is incapable of being dissolved in cold water, spirits of wine, ether, or the acids, but expanding in proportion to the degree of heat, and in boiling-water bursting on one side of the globule; and that after boiling in a large quantity of water, the burst and detached envelopes fall to the bottom in the form of snow-white flakes, leaving the liquid above them as limpid as water.

With respect to the kernel contained within the envelopes, M. Raspail concludes, that if the limpid liquid be cautiously poured off, the addition of spirits of wine, the concentrated acids, or tincture of galls will coagulate it, but it will not coagulate by heat; that it acquires a blue color by adding iodine, a property it possesses in common with the envelopes, but it loses this property by being spread out thinly on a porcelain plate and dried, differing in that case in no respect from gum; and that it does not lose its characters on being dried by a moderate heat, which causes it more to resemble gum with a glass-like fracture, a splintery texture, and a shining surface.

We have M. Raspail's authority, then, for considering the kernel within the envelopes in starch as resembling gum, if not identical with it in physical and chemical characters, and hence we might be led to believe that the nutritive or soluble part is gum, or of the nature of gum. At this stage of the inquiry, however, M. Biot, along with M. Persoz, took up the subject, and succeeded so far in discovering a distinct and very remarkable difference from gum. Accordingly, on isolating the kernel portion of the parsnip root by boiling to burst the envelopes, precipitating by alcohol, purifying by repeated washings with alcohol, and then dissolving it in water in order to observe in what manner it polarized light, it was found that it turned the planes of polarization with more energy towards the right than any substance yet known; while all gums, and the sugar of grapes, turn the planes of polarization towards the left. Cane sugar, indeed, turns the planes of polarization towards the right, but not with the same energy as the kernels of starch. The latter, therefore, MM. Biot and Persoz term *dextrine*, and we shall adopt the term notwithstanding M. Raspail objects to it, till one more appropriate be proposed. The soluble portion accordingly of starch, or the farinaceous matter of grain and roots, is dextrine, which is always contained in a globular envelope, composed of membranes that are incapable of being dissolved in water even when boiling. By means of this

* Hoole's Select Works of Leeuwenhoeck, p. 179.

* Chimie Organique, *sub fin.*

singular and unexpected test of turning the planes of polarization towards the right of the observer, the nutritive qualities of all vegetable substances can be examined, and many of them have been so examined by M. Biot, as we shall presently see. Amongst other vegetable productions, M. Biot examined the juice of the carrot, taken from the white variety, by cold pressure. He divided this into two parts, one part being filtered through white paper without being heated; and another, after being similarly filtered, was brought for an instant to the boiling point. The result was most important in a practical point of view; the part which had been brought to a boiling produced a rotation towards the right exactly double of that which had not been heated, and its absolute intensity corresponded to the proportion of four per cent. of cane-sugar, as deduced from previous observation.

"The liquor," continues M. Biot, "treated with alcohol, gave a considerable precipitate, which was instantly redissolved in water, as is the case with dextrine, and this appears to me to explain sufficiently the sudden increase of the rotation after the boiling." It will follow that even a slight boiling doubles the nutritive quality of carrots, a fact known indeed from other experiments, but only in a vague manner, without any philosophical data to explain it by.

The juice of the turnip exhibited similar phenomena. When it was procured by simple pressure and filtered through paper, the portion which passed the filter exercised no ration that could be appreciated; but on boiling it with the pulp, a liquid was obtained, which turned the planes of polarization towards the right, indicating cane-sugar, as found in the turnip by chemical analysis.

In the juice of the beet-root, so interesting on account of the increasing manufacture of sugar from it, M. Pelouze, a young but able chemist, having found no grape-sugar, or such as is incapable of crystallization, and only cane or crystallizable sugar, M. Biot undertook experiments to investigate the subject still farther. Taking the fresh juice of the beet-root, he repeatedly measured with the greatest care the intensity of rotation which it communicated to polarized light, which he found to vary from 10° to 12° 6′, according to the difference of individual roots, or different parts of the same root, indicating from 11 to 14 per cent. of cane-sugar. The crown and the sides of the root being less mature than the centre, appeared to him to be less rich in the proportion of nine to ten. As the beet root on which the experiments were made had been taken from a field very liberally manured, the large proportion of saccharine matter, indicated by the intensity of the rotation, confirmed the remark of M. Pelouze, that the richness of the manure did not diminish the constituent quantity of sugar, though it renders it more difficult to preserve the roots. M. Biot seems to think that the large proportion of sugar might likewise be partly accounted for by the summer having been dry and hot. There did not appear to be any dextrine, for the white precipitate, perfectly soluble in water, and not coagulable by heat, did not affect the planes of polarization at all, and consequently this precipitate was neither albumen, gum, nor dextrine.

Dextrine was procured by MM. Biot and Persoz from laundry starch (*empois*) by acids cold or hot, strong or diluted, by potass, or by hot water, any one of which will rupture the envelopes, and set free the dextrine. Water alone, however, as M Raspail proved, and MM. Biot and Persoz verified, will not completely rupture all the envelopes of fecula, or at least extract all the dextrine, unless the boiling is continued for a long time with considerable quantities of water; because the unbroken globules of fecula are apt to be held together in clots by the gum-like matter disengaged from the broken ones, and in this manner are partly protected from the full influence of the heat.

The dextrine thus obtained by any of the foregoing agents is uniformly the same, being completely decomposable by heat, while it can be analyzed into water, hydrogen, and carbonic acid gas, but no nitrogen has been found in it. When treated with yeast it undergoes the vinous fermentation, while acids change it into a saccharine syrup; but, when tried by the rotatory polarization of light, this syrup has a greater power in turning the planes towards the right than the sugar of starch in the proportion of ten to three.

Varieties in the unburst Globules.—Before the application of heat or any other agent to rupture the envelopes of the globules and set free the soluble dextrine, the globules themselves afford interesting objects of investigation, as will appear from the following important statement of M. Raspail. He tells us, (*Chimie Organique*, 134,) that in the Paris market he seldom found any wheat flour not to a certain extent mixed with potato starch, by which mixture the fraudulent dealer gains as much as 25 per cent. The potato starch has scarcely any effect on the appearance of the flour, and it requires experience and skill to detect it by the naked eye, unless the quantity of starch be considerable, when the crystalline appearance of the flour gives room for suspicion. The fraud, however, is readily detected by the microscope, and M. Raspail says he could thus discover the starch if it constituted only 1 per cent. of the flour. In examining suspected flour, it is always more easy to pronounce that it is adulterated than to tell in what the adulteration consists. The dimension and form of the globules, as given by M. Raspail, are the chief means by which such examinations can be made, and we think that no extensive dealer ought to neglect making himself thoroughly acquainted with these. He has only to furnish himself with a common microscope and a micrometer or glass plate divided by very minute lines like a foot-rule, and by laying a grain or more of flour on the micrometer, and examining it with his microscope to see how many lines it covers, he will be enabled at once to tell the quality and kind of the flour in question. Micrometers divided so as to measure the $\frac{1}{10,000}$th part of an inch may be employed.

Potato.—The globules containing dextrine in this root acquire a larger size than any hitherto examined, being usually of from the $\frac{1}{10,000}$th to the $\frac{1}{1000}$th part of an inch, or even the $\frac{1}{10,000}$th part of an inch. When fresh they exhibit on the surface concentric wrinkles which disappear on drying. The form of these globules when large is oval; when small more spherical, the former being slightly contracted and bluntly triangular.

Wheat.—The largest globules rarely exceed the $\frac{2}{1000}$th part of an inch, or about half the size of the largest potato globules. They are of a round or spherical shape, and are much smaller when taken from half ripened wheat.

Barley.—The globules of barley are similar in appearance to those of wheat, but are much smaller, rarely exceeding the $\frac{28}{10,000}$th part of an inch.

Oats.—The globules of oats are oval and yellowish, being from the $\frac{276}{10,000}$th to the $\frac{118}{10,000}$th of an inch in diameter. The innumerable minute hairs of this grain give the meal a sort of cottony appearance to the naked eye.

Rye.—These globules are about the $\frac{2}{1000}$th part of an inch in diameter, of a flat form, somewhat sharp on the edge, and marked with a black cross or three black rays forming a central star, which gives a black color to rye flour.

Arrow Root.—The genuine arrow-root from Brazil may be distinguished from the starch of potatoes by boiling, which only produces in arrow-root an enlargement of the globules to four times their original diameter, because, as M Raspail thinks, they are exposed to heat in the original Brazilian preparation, while the globules of the potato expand to twenty or thirty times their original diameter.

The largest globules of genuine arrow-root do not exceed the $\frac{1}{10,000}$th part of an inch, and, like those of rye, exhibit through their translucid surface black lines like a star, or sometimes like the letter T. Potato starch is better than the genuine arrow-root.

Buckwheat.—The globules are yellow, and seldom appear so large as the $\frac{1}{10,000}$th part of an inch.

Maize.—Few of the globules attain the size of the $\frac{28}{10,000}$th part of an inch. The dried fecula is usually injured by grinding, being folded, wrinkled, and more or less rounded. When taken from the half ripe milky grain, they are smooth, entire, and quite round. Hence the dextrine of maize is obtained in greater proportion from the half-ripe seeds; and hence also the small proportion of starch found by the usual modes of chemical analysis, though it actually exist in the grain.

Peas.—The globules of peas are of the same form as those of the potato, with an unequal surface, and the largest are about the $\frac{2}{1000}$th part of an inch.

Beans.—The globules are of the same size as those of peas, but differ from being egg-oblong, or kidney-shaped, sometimes appearing as if a smaller grain were enclosed in the interior.

Other globules were examined and measured by M. Raspail, but these are the most interesting for our present purpose; and, before proceeding farther, it is indispensable to impress upon the attention of the reader,

1*st*, That the globules constituting meal, flour, and starch, whether contained in grain or roots, are incapable of affording any

nourishment as animal food till they are broken.

2*d*, That no mechanical method of breaking or grinding is more than partially efficient.

3*d*, That the most efficient methods of breaking the globules is by heat, by fermentation, or by the chemical agency of acids or alkalies.

4*th*, That the dextrine, which is the kernel, as it were, of each globule, is alone soluble, and therefore alone nutritive.

5*th*, That the shells of the globules, when reduced to fragments by mechanism or heat, are insoluble, and therefore not nutritive.

6*th*, That, though the fragments of these shells are not nutritive, they are indispensable to digestion, either from their distending the stomach and bowels, or from some other cause not understood, it having been proved by experiment that concentrated nourishment, such as cane-sugar, essence of beef, or osmazome, cannot long sustain life without some mixture of coarser and less nutritive food.

7*th*, That the economical preparation of all food containing globules of fecula consists in perfectly breaking the shells, and rendering the dextrine contained in them soluble and digestible, while the fragments of the shells are at the same time rendered more bulky, so as the more readily to fill the stomach.

We hope these principles have been here put in intelligible and unequivocal language, so that they may not be misunderstood, seeing that they are of the very highest practical importance in preparing the food of all live-stock as well as of our own. But lest some of our readers of the old school, who are apt to reject most novelties as theoretical, should refuse to admit the truth of the deductions, it may be well to corroborate the results from actual experiments made by those who were ignorant of the very existence of the globules described by M. Raspail or the dextrine of M. Biot.

(To be continued in our next.)

INFERIORITY OF ENGLISH TO CHINA INK.—The directors of the Bengal bank lately refused payment for a number of bank notes, in consequence of their containing no signature. It appeared that they belonged to a Hindoo, who had kept them in a copper box. He asserted that they originally possessed the signatures of the director, comptroller, cashier, &c., but that they had been effaced. The notes on which the signatures had been written with China ink remained uneffaced, but all the writing with English ink had completely disappeared. Mr. Princep, in order to determine the question, placed a paper covered with writing in English ink between two plates of copper. After a short space of time he found that the copper had decomposed the ink, and that the writing was completely effaced. He concluded that the account of the Hindoo was correct, and that the bank ought not to refuse payment. —[Rec. Gen. Science.]

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* Asiat. Society Journal, and L'Institut, 189, 368.

CULTIVATION OF FILBERTS.—Sir, in consideration of the periodical return of the season for trying the merits of the suggestion I inserted in your number 183, just 10 years ago for improving the crop of filberts, and as I have reason to believe from my own and other's subsequent experience, that my idea is well founded, you will perhaps allow the re-appearance of the following:—"In countries where figs are cultivated to the greatest perfection, particularly in Italy and Greece, a great augmentation, both in the size and number of the figs, is obtained by placing on the top of the tree a branch of the wild fig-tree (*Caprificus*), upon which have appeared male-flowered figs, which are the first to come forth. I have often thought, that the crop of filberts might be both ameliorated and increased, by a somewhat analogous application of a branch of the common hazel, when covered with the 'cat-kins' or flowers. This is just the time to try the experiment." I hope that some of your correspondents who have the opportunity, will try and report upon the experiment. Besides the increase of the pollen, it may have an effect like the recurring to the original stock by grafting or seed, as with apples and some other fruit-trees. Filbert-trees are often deficient in male flowers.—Yours, &c., F. MACERONI.

THE IMPORTANCE OF TIME KEEPING.—The topography of watch-making, at home and abroad, would present a vast number of curious and interesting facts.—In consequence of the minute subdivision of labor in this trade, it is said that there are only three places in the United Kingdom where a complete watch can be manufactured,—London, Liverpool and Coventry. The business has been introduced at the latter place entirely since the year 1800, and the number of persons employed in it there is now supposed to equal the number in the metropolis.

ANALYSIS OF IRON ORES.—Berzelius states the following to be a rapid mode of analysing these ores. He boils them with chloride of copper slightly acidulated with muriatic acid, then on boiling the residue with carbonate of soda, washing the result, drying and weighing, its weight indicates that of the barbon.*—[Rec. Gen. Science.]

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* L'Institut, 170.

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16—10t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August nex, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer
Selma, Ala., March 20th, 1837. A 15 tf

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

Instruments made to order and repaired. 14 1y

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rohester, Jan. 13th, 1837. 4—y

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States 9—1y

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER,
33—tf. GEORGE COLEMAN,

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J26tf

TO RAILROAD CONTRACTORS.

PROPOSALS will be received, at the office of the Hiwassee Railroad Com., in the town of ATHENS, TENNESSEE, until sunset, of Monday, June 12th, 1837; for the grading, masonry and bridges, on that portion of the HIWASSEE RAILROAD, which lies between the River Tennessee and Hiwassee. A distance of 40 miles.

The quantity of excavation will be about one million of cubic yards.

The line will be staked out; and, together with drainings and specifications of the work, will be ready for the inspection of contractors, on and after the 1st day of June.

JOHN C. TRAUTWINE,
Engineer in Chief Hiwassee Railroad.
16—6t.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

										lbs.
350 tons	2½	by	½,	15 ft in length, weighing						4 $\frac{68}{100}$ per ft.
280	"	2	"	½,	"	"	"			3 $\frac{50}{100}$ "
70	"	1½	"	½,	"	"	"			2½ "
80	"	1½	"	½,	"	"	"			1 $\frac{25}{100}$ "
90	"	1	"	½,	"	"	"			½ "

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3½, 3¾, 3¾, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—v1f H. R. DUNHAM & CO.

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds, Iron and Brass castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR.
Paterson, New-Jersey, or 60 Wall street, N. York. 5tf